TRENDS IN FACULTY EVALUATION: VARIABLES WHICH DISCRIMINATE BETWEEN TENURED AND NONTENURED FACULTY, 1972 TO 1976

BY

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The purposes of this study have been:

(1) to examine the differences between the "new academicians" attaining tenure and those who do not during the seven year period, 1970 to 1976, based on data gleaned from personnel files managed by the Office of Academic Affairs at a large southeastern university, and

(2) to examine the extent to which sex of these faculty members has influenced the tenure decision.

Three multivariate statistical techniques are used: discriminant function analysis, Rao's T_2, and multiple regression analysis. Discriminant functions adjusted for prior probabilities are derived so as to examine the separation of tenured from nontenured groups two ways. The first basis for this discrimination is "experience" (or longevity), as measured by academic rank and years in tenure track. Next, "merit" (or productivity) variables are added to the "experience" variables to examine, by using Rao's T_2, the degree of increased discrimination apparent from the addition of data regarding a faculty member's awards and honors, publications, exhibits, memberships in professional fraternities, civic organizations, professional registrations, and sex. Multiple regression equations allow examination of the independent influence of sex on tenure status, and of sex, tenure status, and the experience variables on each of the "merit" (or productivity) variables.

To see in which ranks and for which number of years in tenure status differences exist between tenured and nontenured groups, Student's t statistics are used. Only those comparisons based on thirteen or more faculty members per t statistic are tabulated. Out of potentially 600 such tests, therefore, 172 could be computed for this study.

Rao's T_2 indicates that "merit" variables significantly increase the discriminating ability of an equation to separate tenured from nontenured faculty, beyond the discrimination possible based

on "experience" variables alone. The practical significance of this finding is diminished by the results of the 172 t tests which, in over 90 percent of same, indicated no significant differences. The practical significance of such results is ambiguous, however, since less than one-third of the possible combinations could be examined.

The regression coefficients for the sex variable in each of the years analyzed indicated that sex did not significantly affect the prediction of tenure status. The fact that more than 80 percent of nontenured and 90 percent of tenured faculty in this study were males indicates that widely disparate sample sizes limit the probability of substantial reduction in the error term related to tenure status.

In the concluding chapter, implications for affirmative action, faculty development, and the usefulness of a mixed model (of merit and experience variables) are discussed. Suggestions for further research are raised, as well as advice to administrators at the various levels of academic affairs.

CHAPTER ONE
THE AWARD OF TENURE

> It hardly needs to be documented that teacher tenure is under attack today. Moreover, it is a continuing attack; what seemed in the late 1960s to be a particular reaction to educational and social upheaval now has developed into a sustained assault.

With this introduction, Sherman (1975, p. 167) summarizes a prevailing trend in American higher education, that of criticism of tenure. Yet he, like others, decries the lack of empirical research to support these criticisms.

One of the central disagreements of the "tenure debate" is whether or not tenure causes colleges and universities to be staffed with "mediocre" and "incompetent" faculty. Another is whether or not tenure makes jobs less available for groups targeted for affirmative action.

Studies are frequently found which correlate academic rank with research productivity, teaching evaluations, time in the university setting, etc. The decision to award tenure, however, has escaped in-depth review by these debaters. No studies have been found by this reviewer which examine meritorious performance and affirmative action measures at the time of tenure award. The evaluative and affirmative action implications of the tenure award decision could provide important evidence to these disagreements.

The present study addresses this aspect of the "tenure debate." The object of this dissertation is to analyze empirical data indicating the relationship between "meritorious" performance of faculty members, their sex, their experience as academicians, and the probability that they will be granted tenure in a particular year.

Faculty evaluation for tenure award is purported to include analysis of "meritorious" performance. That is, teaching ability, research productivity, and service to the institution and community (traits commonly mentioned as qualities exhibited by tenured faculty) are critical evaluative material, and those faculty performing well on these criteria are said to have exemplified "meritorious" performance. Jaeger and Freijo present the following information regarding faculty evaluations in one state:

> . . .the Board of Regents of the State University System has developed guidelines on criteria to be used for retention, tenure, and promotion of faculty. The three areas of teaching, research, and service are to be weighted 70%, 20%, and 10%, respectively. (1974, p. 416)

The present study is limited to examination of two components of "meritorious" performance--the research productivity component and the service component.

The element of "experience" is also critical to the tenure award. Years in tenure track and academic rank are the indicators of experience which are examined in this study. The first of these variables is said to determine the critical date for the

tenure decision, as is indicated by the following quote from the Board of Regents' Operating Manual, Administrative Procedures Code, Chapter 6C-5, of the institution being studied:

> (1) Eligibility for tenure for academic faculty members normally shall begin after five years of service in a tenure earning position after which time an individual may be nominated for tenure in accordance with established procedures. At the discretion of the president, he may recommend credit for not more than two years spent in a tenure-earning position at another university or two years of equivalent experience may be transferred by an individual who is hired at a state university. . .as an assistant or associate professor, and credit for not more than four years may be transferred by an individual who is hired as a full professor.
>
> (2) The Board of Regents may approve tenure at an earlier time if it is recommended with sufficient justification by the president with the concurrence of the Chancellor.
>
> (3) The employment of a faculty member in a tenure-earning position who has not been granted tenure at the close of the sixth year of continuous employment shall not be renewed.

Similarly, academic rank can be regarded as a measure of experience in that it is intimately tied to years of service. Tenure is often awarded to faculty members with rank of associate professor or higher; to include academic rank in any other way would obscure the questions of interest here, i.e., the extent of affirmative action and the levels of competence demonstrated by faculty data available at the time of tenure award.

Since the Civil Rights Act of 1964, attacks upon tenure have also thrown a spotlight on potentially discriminatory action demonstrated by nonretention of women and minority groups in tenured

positions. The final regulations of Title IX of the Higher Education Amendments of 1972 constitute the culmination of this concern in areas of higher education academic management. Tenure is specifically mentioned (Sections 86.51-86.56) as one aspect of employment for which discrimination will not be tolerated.

The "affirmative action" aspect of the tenure award decision is a second point of inquiry for the present study. This inquiry is limited, however, to an examination of the differences relative to the sex of the faculty member when tenured and nontenured ranks are compared on "experience" and "merit" variables. A complete analysis of the affirmative action question would include other minority variables as well. During the years 1972 to 1976, this institution retained so few faculty members of non-white ethnicity in its tenure track positions that the statistical comparisons performed in this study would be meaningless as indicators of racial differences.

Critics of tenure seize statements such as those quoted above from the Operating Manual as evidence that the major qualification necessary for attaining tenure is experience as an academic faculty member, and that little or no emphasis is placed on evaluation of that experience. This argument will be examined in light of available data.

University constitutions are not much help as indicators of centralized policies for evaluation of faculty for tenure. One

example follows, which is much more vague than either Jaeger and Freijo (1974) or the Operating Manual:

> Nomination of a faculty member for tenure shall signify that a high degree of competence has been demonstrated and that continuing employment of the faculty member will serve the best interests of the institution and the University System.

Yet, it is the president of the university whose recommendation results in the award of tenure.

This confusion is demonstrated in many state systems of higher education, as the literature review of the next chapter will show. Critics of tenure argue that ambiguous policies are written because the other alternative would be to document patronage, or higher education's "pork barrel." The present study will evaluate this claim.

As stated earlier, many studies have examined the relationship between academic rank and various measures of meritorious performance. By considering academic rank as a measure of experience, this study will be able to examine the added explanatory power of meritorious performance variables, at the time of tenure award. Other analyses have been performed to examine the "best" ratio of tenured to nontenured faculty based on years of faculty experience, their age, etc. The present study will analyze the statistical significance of both types of variables.

Subsequent to the tenure award, higher education management is committed to enforce academic freedom and economic security for

its tenured faculty members. To provide economic security for someone is a considerable financial undertaking; administrators ask, how do we know that this investment is secure and that it will pay off? Students as consumers also want a return on their investment of time and money. Faculty wish to maximize their investment in the profession and compare and evaluate the performance of their peers, both tenured and nontenured, in this light.

In this first chapter, a brief review has been presented of several sources of discontent with tenure. This study will evaluate some claims of critics of the tenure system generated subsequent to Title IX and the "educational and social upheaval" which Sherman cites at the beginning of this chapter. The approach used in this study to accomplish these evaluations is presented next.

Statement of the Problem

The Academic Affairs Office of a state university with a student body of over 35,000 has computerized its personnel information on all university faculty for many years. This institution is among the Carnegie Commission's top ranking Category 1 research-graduate institutions, granting more than 100 doctorates a year, and is ranked in the top 50 among colleges and universities receiving the largest amount of federal funds. Among the types of information kept since 1972 on each faculty member are the following:

(1) social security number

(2) tenure status ("tenured" or "nontenured, accruing")

(3) sex

(4) academic rank (professor, associate professor, assistant professor)

(5) years in tenure track granted the faculty member on the basis of experience

(6) publication rate (books, national journal articles, local journal articles, other publications)

(7) awards and honors received

(8) memberships (professional fraternities, civic organizations, professional registrations)

(9) exhibits of professional works

For the purpose of this study, the above variables have been classified into three categories, based on the mathematical properties appropriate for the individual variable. The nominal variables--i.e., those for which an assigned number relates only to classification and not to any amount of the variable held by the individual--are social security number, tenure status, sex, and academic rank. The three academic ranks are reflected here as two dichotomous variables. The second category of variables has a restricted range of values, but those values relate to amounts of the variable held by the individual. A finite number of values on these variables is possible. Years in tenure track for previous experience fits this category. Years in tenure track is the sum of years of credit and years employed by the university, and will

have a maximum value of seven only in 1976. The third type of variable examined here is related to the productivity and meritorious performance of the faculty member. Number of publications, awards, honors, exhibits, and memberships are classified here. The possible range of values on these variables is considered unlimited.

The problem researched here is: do examples of excellence and/or sex of the faculty member affect significantly the decision to grant tenure, above and beyond that attributable to experience variables alone? Do these data suggest that meritorious performance enhances the probability of a faculty member's tenure status? Which variables are more enhancing? Has the sex of the faculty member anything to do with the ability to achieve tenure?

Limitations of the Sample

A faculty member is included in this study if he or she fits the following criteria:

(1) has a tenure-accruing year no earlier than 1970, and

(2) is considered to be either in tenure track or has been granted tenure status during the term 1972 to 1976.

By limiting the inquiry to faculty data based in the years 1970 to 1976, it is assumed that the individuals are homogeneous with respect to progress along the "tenure-granting cycle"; that is, a cycle of five year employment, followed by a review for tenure status, followed by a decision to either award tenure or not.

A second intention of this selection was to limit examination to those faculty judged by university management to have very current university experience. For whatever reasons, the university administration has judged these faculty to be "new academicians." One logical effect of this limitation is to vary probabilities of obtaining tenure during the years 1972 to 1976, increasing as the years of applicable experience increased.

For example, the subgroup of faculty whose data are analyzed in 1972 will have only one, two, or three years in tenure track. The subgroup of faculty data analyzed in 1976 will reflect up to seven years of tenure track experience. Since the tenure-granting cycle approximates five years, it is more likely that faculty members nearing five years in tenure track will be awarded tenure than will faculty with fewer years of experience.

This study does not focus on all faculty members who are considered for tenure in each year. Instead, data are studied from faculty who are classified by administrators as having current experience before coming to this university and are given up to five years to perform at this campus and to be considered for tenure.

The computerized personnel files analyzed here do not contain information concerning which members of the faculty were reviewed for tenure and denied, counseled out, or switched to nontenure-accruing status. Neither is it known whether or not a

faculty member's "disappearance" from the computerized files is a manifestation of new employment, altered status with regard to tenure (i.e., movement into "nontenure accruing" status), or some other reason. Once a faculty member has been awarded tenure, however, that person's data are dropped from the statistical analyses of future years.

Method of Analysis

The rank and years in tenure track are known for faculty members in tenure-accruing status and for those granted tenure in each year. An equation is generated which separates the "tenured" from the "nontenured, accruing tenure" faculty on these measures. The accuracy of discrimination between the two groups is determined. Next, the "merit" measures are added to the "experience" variables on these same faculty, and a second equation is derived to discriminate between these same two groups.

A statistical test is performed on information gleaned from the two equations so as to test the significance of the "merit" variables and the common variance shared by all. For those years in which a significant difference is found, Student's t statistics are derived for each "merit" variable. The two group comparisons are done between tenured and nontenured faculty, controlled for rank and years in tenure track. For example, one might be conducted for the variable "number of books published" comparing

the group, nontenured Associate Professors having four years tenure track experience, with newly tenured Associate Professors having four years tenure track experience. Such tests can only be done if the two groups are sufficiently large. This is detailed in Chapter Three.

Two sets of regression equations are generated from the data in each year. To test the hypothesis concerning sex of the faculty member, all independent variables are entered as predictors of tenure status. Since the only variable of interest at this stage of the analysis is sex of the faculty member, its coefficient and F-ratio are the only statistics examined from these equations.

Using each merit measure in each year as the dependent variable, a second set of regression equations is generated. Predictors for this set of equations are academic rank, tenure status, sex, and years in tenure track. The unstandardized coefficients for the dichotomous variables indicate the average differences between the two groups on each merit measure.

Hypotheses

Long-range planning in colleges and universities may be essential if this type of educational facility is to continue to exist. Several papers over the past years have used Markov Chain analysis on numbers of faculty fitting descriptions such as "tenured--age 55 to 58, low salary" in order to predict the number of new faculty

positions, age distribution of faculty, and ways to reduce total personnel costs.

Little consideration has been given, however, to the qualities possessed by the faculty members fitting such categories as "tenured--age 55 to 58, low salary," i.e., publications, awards, etc., at the time of the tenure award decision. To include meritorious growth of faculty members in long-range planning, this study asks questions such as the following:

(1) What are the frequently-referenced indicators of faculty quality?

(2) Are these indicators valid, in terms of their discriminatory power between tenured and non-tenured faculty at the time of tenure award?

(3) Do these variables discriminate in a way which would indicate that growth is valued?

(4) To what extent does a mixed model of "merit" and "experience" variables improve our understanding of the process of obtaining tenure? How does such a mixed model change over time?

(5) What progress has been made with regard to affirmative action implications of attaining tenure, particularly for female faculty members?

Statistical analysis has been performed on the variables listed previously in a manner which provides further information concerning the strength of the data supporting possible answers to the aforementioned questions. Stated in the null, the hypothesis tested using Rao's T_2 is as follows:

For each of the years 1972 to 1976, the discriminatory power of an equation including information about a faculty member's publications, memberships, awards, honors, and exhibits, as well as experience variables (academic rank and years in tenure track) is no greater than one including only experience variables.

For those years in which a difference is found to be significant between the two equations, in-depth analyses of the "merit" variables will be performed in order to determine the composition of the increased discriminatory power.

The null hypotheses tested by the multiple regression subroutines are:

(1) For each of the years 1972 to 1976, knowledge of the sex of the faculty member does not significantly increase the amount of variance explained in the dependent variable "tenure status" when other independent variables (related to experience and merit) are controlled.

(2) For each of the years 1972 to 1976, the distribution of faculty ranks, tenure status, sex, and years in tenure track does not lead to significant mean differences (as indicated by the unstandardized regression coefficients) on each of the merit variables.

Three other questions of interest are:

(1) Is growth, or increased production, valued more than absolute number of "merit" measures?

(2) If a decision is made to achieve a steady-state ratio between tenured and nontenured faculty, is a steady-state achieved among production of "meritorious" works?

(3) To what extent do central and decentral administrators rely on these data as supporting documentation for decisions to award tenure?

The statistical techniques used in the present study do not permit significance testing of these questions; it is hoped, however, that some trends will be discovered in the data which may indicate directions of fruitful continued research.

Assumptions

(1) It is assumed that the recorded data are accurate.

(2) It is assumed that the entire university population of faculty who began accruing tenure as of 1970 at this university is included.

(3) It is assumed that the sample of university faculty contributing data to this study is a standard representation of faculty fitting the criteria herein described.

(4) It is assumed that exclusion of data regarding department and college of employment does not distort the meaning of the analysis. That is, it is assumed that the comparison of tenured and non-tenured faculty is not to any large extent a comparison of members of departments or colleges that have very different standards for granting tenure.

(5) It is assumed that these data accurately reflect the data available in the tenure-granting decision process, both in its informal and formal aspects.

Organization of the Study

The remainder of this study is presented in the following format: Chapter Two is the literature review; Chapter Three presents the methodology used for statistical analyses of the data; Chapter Four is the presentation of results of the analyses; and Chapter Five discusses the implications of the results of the data analyses, conclusions, and recommendations for further research.

CHAPTER TWO
REVIEW OF THE LITERATURE

> The exact meaning and intent of this so-called tenure policy eludes us. Its vaporous objectives, purposes, and procedures are lost in a fog of nebulous verbiage. (Worzella v. Board of Regents, 1958)

The above quote from the Supreme Court of South Dakota is typical of the criticisms surrounding tenure policies and tenure award decisions. In this chapter, a brief review will be presented of several sources of discontent with tenure as a policy in higher education:

(1) why tenure is sought by faculty and vilified by critics, and

(2) the diversity of tenure practices compared to tenure policies.

This will be followed by a description of the available literature regarding three characteristics of faculty:

(1) their length of time as academicians,

(2) their meritorious performance, and

(3) affirmative action regarding tenured positions.

As was referenced in the previous chapter, this reviewer has found a paucity of literature which measures faculty characteristics at the time of tenure award. Empirical studies are available regarding the faculty promotion process in general, and correlation studies regarding academic rank abound. Similarly, quantitative

studies of some characteristics of tenured faculty exist. One assumption of this review is that these studies of faculty promotions are relevant to the present study of the tenure award decision, since in many institutions the tenure and promotion processes are inextricably linked. Further, the characteristics of faculty members who have attained tenured status bear on the nontenured faculty's perception of the role models leading to tenured status.

The Meaning of Tenure

The most important statement of tenure policy probably is the 1940 Statement of Principles on Academic Freedom and Tenure, published by the American Association of University Professors. It states, in part:

> Tenure is a means to certain ends--specifically, (1) freedom of teaching and research and of extramural activities and (2) a sufficient degree of economic security to make the profession attractive to men and women of ability. Freedom and economic security--hence tenure--are indispensable to the success of an institution in fulfilling its obligations to its students and to society. (Reprinted in Keast and Macy, 1973, p. 250)

Most sources agree that the history of academic freedom (and lack thereof) has led to the tenure policies and practices of today. The dual goals of academic freedom and economic security are basic to the purpose of the tenure award. Partly as a response to the low salaries offered to instructors, partly to attract more

qualified people to instruction, and partly to limit the emphasis on politics, tenure policies have been implemented (in some form) with abundance through the twentieth century.

Byse and Joughin (1959) present some of the classic elements of a definition of tenure. Tenure status is granted, they point out, usually after a probationary period and is the institution's offer of protection of the faculty member from dismissal except for cause as determined through due process. The most frequently stated causes for dismissal from employment subsequent to the award of tenure are professional incompetence, failing in institutional relationships, incapacity or disability, crime, and/or immorality. The implications of due process usually include:

(1) the right to counsel,

(2) the right to present and summon witnesses,

(3) the right to cross-examine,

(4) the right to a full and available record,

(5) the right to a prompt hearing,

(6) the right to be present, and

(7) the right to appeal.

In a 1973 AFT publication entitled, "What is Tenure? A Critical Explanation," Sherman defines tenure as:

> ...the fact or right of holding something, especially property; in the case of teachers, it is the right to hold their jobs. "Tenure" also refers to the manner and condition of holding one's job. It is the status granted, usually after a probationary period, which protects the teacher from dismissal except for cause to be determined through a formal hearing....(1973, p. 10)

The Commission on Academic Tenure in Higher Education regards tenure as

> . . .a means of ensuring academic freedom and of providing sufficient economic security to make the academic profession attractive to men and women of ability--both objectives being indispensable to the successful fulfillment of the social purposes of higher education. (1973, p. 2)

The Commission's publication, Faculty Tenure, was the culmination of a year-long study. The Commission's task was to investigate and evaluate the "tenure system" in higher education. The Commission formally defined tenure as

> . . .an arrangement under which faculty appointments in an institution of higher education are continued until retirement for age or physical disability, subject to dismissal for adequate cause or unavoidable termination on account of financial exigency or change of institutional program. (1973, p. 256)

Alchian, in a 1959 essay entitled "Private Property and the Relative Cost of Tenure," described tenure as

> The special employment relations in the professors' market. . .whereby the professor has job security except for immoral acts, loss of mental competence, or financial disability by the college. The professor is assured of his job security so long as his teaching reflects his search for the truth. (1959, p. 350)

The need for tenure is outlined in the AAUP 1940 Statement of Principles, as related by the Commission on Academic Tenure in Higher Education:

> Institutions of higher education are conducted for the common good and not to further the interest of either the individual teacher or the institution as a whole. The common good depends upon the free search for truth and its free exposition. (1973, p. 250)

Carr (1972) expresses the opinion that tenure is a prerequisite of effective performance, as the only unencumbered method freeing the academician from arbitrary or capricious pressures which infringe upon the search for truth. Sherman reinforces this opinion:

> It has been said that most workers can go from day to day without running the risk of political disfavor because their work is technical or mechanical, but the teacher's work is critical thought and speech itself. (1973, p. 31)

Caplow and McGee (1958) also maintain that the "cyclical and sporadic" nature of intellectual creativity is not easily understood, and is thus suspect; tenure alleviates some of this pressure.

Byse and Joughin comment:

> Academic freedom and tenure do not exist because of a peculiar solicitude for the human beings who staff our academic institutions. They exist, instead, in order that society may have the benefit of honest judgment and independent criticism which otherwise might be withheld because of fear of offending a dominant social group or transient social attitude. (1959, p. 4)

These quotations speak convincingly in support of tenure. The Commission on Academic Tenure in Higher Education summarizes the supportive arguments:

> (1) Tenure is an essential condition of academic freedom: it assures the teacher that his professional findings or utterances will not be circumscribed or directed by outside pressures, which could otherwise cost him his position; and it assures students and the public, who support and rely upon the teacher's professional integrity, that the teacher's statements are influenced only by his best professional judgment and not by fear of losing his job.

(2) Academic tenure creates an atmosphere favorable to academic freedom for all--the nontenured as well as the tenured--because the tenured faculty form an independent body capable of vigilant action to protect the freedom of their nontenured colleagues. The fact that probationary faculty members have academic freedom without tenure does not prove that tenure is irrelevant to academic freedom.

(3) Academic tenure, by creating a faculty with a strong long-term commitment to the institution, contributes to institutional stability and esprit. It thus promotes collegiality, joint responsibility for professional and institutional standards, and effective institutional governance.

(4) Tenure assures that judgments of professional fitness will be made on professional grounds and not on grounds of competitive personal advantage.

(5) By forcing institutions at a definite time to decide on whom to confer tenure, and whom to let go, the tenure system helps institutions avoid continuing on their faculties those who are agreeable but not outstanding and whose term appointments might otherwise be renewed regularly out of generosity, friendship, or neglect.

(6) Tenure is an important means of attracting men and women of ability into the teaching profession; by minimizing competitive economic incentives, it encourages teachers to concentrate on their basic obligations to their students and their disciplines.

(7) Tenure has an economic value that helps offset the generally lower financial rewards of higher education, thus enabling institutions to compete for professional talent--especially in such fields as law and medicine, which have highly developed markets outside the colleges and universities. (1973, p. 15-16)

Two criticisms of tenure were introduced in Chapter One, i.e., (1) tenure protects the incompetent, and (2) tenure makes jobs

less available for groups targeted for affirmative action. Additional criticisms of tenure typically cited include:

(1) the origins of tenure are lost in the haze of history;

(2) tenure no longer is needed to protect academic freedom;

(3) tenure should be reviewed periodically;

(4) tenure is made too easily and quickly; and,

(5) tenure is a special kind of security enjoyed only by teachers. (Sherman, 1973)

These arguments have been addressed by many authors. Sherman (1973) presents a critical analysis of the above arguments, countering with information from a variety of sources.

One important fact at the root of all debates about the merits of a tenure system is that it is expensive. To provide economic security for the lifetime of a faculty member costs a significant amount. Yet cost effectiveness in higher education has not been measured, as the Commission on Academic Tenure points out:

> Since higher education was becoming a right, and since its mounting costs were increasingly and obviously borne by every taxpayer..."accountability" became a watchword in educational debate. What good teaching is, how curricula should be organized, how and by whom teaching effectiveness could be measured--all these remained as unclear as ever. (1973, p. 10)

Lack of clarity--this is probably the central source of disparate comments regarding higher education policy in general and the decision to award tenure in particular. Critics of tenure point to

the language used in official definitions (some of which were quoted earlier) and expound about the undue protection they argue is inherent in the tenure award. They believe that one demonstration of competence, if not followed by excessive malfeasance (which must be demonstrated through due process), will insure a faculty member's right to hold his academic appointment until retirement. The result, they claim, is entrenched mediocrity.

The nontenured faculty member actively seeking tenure is perhaps hit hardest by this unclear evaluative process. It is difficult to participate in a procedure without benefit of specific guidelines. This first section has delineated what the award of tenure means and has discussed the positive and negative effects of the decision to award tenure. The next section presents the available information regarding the diversity of tenure award practices which have evolved from "standard" tenure policies.

The Practice of Tenure Award

Gerber is quoted in Dissertation Abstracts:

> No significant correlation was found between the quality of published statements on ... tenure and the quality of actual practices at the colleges. (1972, p. 2017)

Gerber had surveyed 23 small, private, Mid-West colleges to study the relationship between academic freedom and tenure practice and institutional quality. Similarly, Walters (1971) interviewed administrators in seventeen Indiana colleges and universities, and

concluded that ". . .the smaller the institution, the less formality and codification of . . .tenure plans and practices" (1971, p. 3067).

Imprecise application of AAUP guidelines regarding tenure award decisions, it seems, occurs with some regularity. Jaeger and Freijo (1974) quoted a weighting system of 70-20-10 for three categories of evaluation in one state system of higher education. In 1950, Minot College of North Dakota published its evaluation instrument for faculty. The distance in management information provided between these two examples alone might pale the careful thinker; the knowledge that the majority of institutions of higher education do not share even this much information with their faculty is more disheartening.

A 1967 study by Luthans asked faculty respondents:

(1) Were the promotion policies of their institution communicated to them?

(2) What was the general consensus of themselves and their colleagues concerning promotion policies and practices? (1967, p. 35)

The following table was used by Luthans to demonstrate the faculty members' descriptions of promotion policies in universities where central administrators described the policies as spelled out and known by everyone.

TABLE 2-1
POLICY DESCRIPTION BY FACULTY MEMBERS

Policy	Faculty Response Rate (%)
(1) There are no policies.	2%
(2) The policy is nebulous and confused and could not be communicated to anyone.	23
(3) The policy is not written but it is implicitly understood by the majority of faculty.	43
(4) The policy is spelled out and known by everyone.	32

(source: Luthans, 1967, p. 63)

To explore further the distance between management information systems, specifically the system of attaining tenure, Luthans also examined the central administrations' descriptions of promotion policies in universities having faculty members who state non-existent or nebulous promotion policies. Luthans' results are tabulated by the current author in the following table.

TABLE 2-2
POLICY DESCRIPTION BY CENTRAL ADMINISTRATORS

Policy	Response Rate (%) of Central Administrators
(1) There is no promotion policy, as such, at the central level.	8%
(2) The policy is not written and probably varies from case to case.	26
(3) The specific criteria are not necessarily written but implicitly understood by the majority of faculty.	31
(4) The specific criteria are spelled out and known by everyone.	35

Walters held structured interviews with the chief academic officers of seventeen accredited colleges and universities in Indiana so as to "clarify the current status of the tenure principle." Walters concludes:

(1) Tenure...purposes and goals tend to be ambiguous.

(2) The critical test of the loci of tenure authority is where the process is initiated and by whom the original evaluation is made.

(3) The extent of real tenure decision-making on the part of the academic officer is inversely related to the size of the institution.

(4) The percentage of probationary appointees achieving tenure is dependent upon the care exercised in original faculty selection.

(5) Size of institution, not type of institution, tends to reveal differences in tenure plans and practices. The smaller the institution, the less formality and codification of the tenure principles.

(6) Academic tenure protects academic freedom and teacher incompetency.

(7) Because of financial problems and a flooded market of teachers, tenure will be offered less frequently . . .in the 1970s. (1971, p. 3062)

Shaw (1972) researched the policies for tenure award and termination in 106 member institutions of the National Association of State Universities and Land Grant Colleges. Acquisition of tenure was of two types: "automatic" and "evaluative." The documents of 44 institutions prescribed automatic acquisition of tenure at a particular rank and after a specific probationary period. Evaluative tenure, or tenure which <u>could</u> be granted at a particular rank and after a specific period, but which was not necessarily automatic, was professed by the documents from 34 institutions.

Two issues examined by the Commission on Academic Tenure (1973) relating expressly to the tenure award decision were (1) the formality of reasons for denial of tenure, and (2) the percentage of faculty considered for tenure who actually received tenure. Two important facts are revealed by their study: (1) less than 40 percent of the institutions questioned always accompanied notice of

non-renewal with written reasons, and (2) approximately 30 percent of public universities questioned did not answer the inquiry regarding percentage of successful tenure candidates. (1973, p. 219).

The Commission also examined 1969 Carnegie Commission survey data for attitudes held by faculty, both tenured and nontenured, within public universities. The Commission concluded:

> In their attitudes toward themselves, their colleagues, their institutions and their profession, tenured and nontenured faculty display significant differences. (1973, p. 229)

Using averages across all faculty categories, the Commission remarks:

> ...it is striking that 78% of faculty members believe that teaching effectiveness and not publication should be the primary criterion for promotion, while 44% say that tenure is in fact very difficult to achieve for the person who does not publish. Clearly, the tenure system is not now operating to reflect in personnel decisions the priorities generally espoused by the faculty....(1973, p. 231)

The literature cited above reflects a practice of tenure award which is unstandardized. The process of evaluation for tenure has been criticized because of its lack of clarity in addition to its diversity. The section which follows indicates several criteria regularly quoted as necessary for attainment of tenure, along with available statistical analyses of the contributions of these criteria.

Longevity and the Tenure Award

In Chapter One, the Board of Regents of one state were quoted regarding the role of time, or experience, in determining the faculty

member's consideration for the award of tenure. The 1972 survey of the American Council on Education includes a nationwide review of this same criterion, as quoted in Keast and Macy:

> (1) Both initial and succeeding contracts during the probationary period are for one-year periods in most four-year and two-year colleges, both public and private. In universities, nearly two-thirds use one-year initial and renewal contracts; about one-third award contracts for two or more years.
>
> (2) In general, the maximum probationary period ranges from three to seven years....The median term is six years for all institutions, seven years in private universities, four years in public two-year colleges. Eighteen percent of all institutions use a maximum of four years or less.
>
> (3) There is great variation among types of institutions in allowing credit for prior service to reduce the probationary period...Universities, public and private, and private four-year colleges are more generous in granting credit for prior service, but from 33 to 41 percent even of these institutions do not do so. When credit for prior service is granted, the usual limit is three years, although 21 percent of the public universities allow credit for four years or more. (1973, p. 4-5)

Shaw (1972) reviewed the tenure policies of 106 member institutions of the National Association of State Universities and Land-Grant Colleges, based on the content of documents received and mail questionnaires returned. The existence of an "up or out" policy regarding promotion and tenure was evident in the documents of twelve institutions. According to this policy, a teacher was either promoted to a higher rank at the end of the probationary period, or his service was terminated.

The 1974 survey of the Higher Education Panel membership (644 institutions) of the American Council of Education concludes:

> At public universities, the proportion reporting maximum periods of seven years or longer (probationary periods) increased from 44% in 1972 to 57% in 1974. (1974, p. 3)

Furniss (1973) states that during competitive periods, institutions considered faculty for tenure long before the statutory requirement, and granted tenure as well:

> ...in one multicampus university, decisions that by statute had to be made by the end of the sixth year have been made, on the average, after 4.2 years of service. (1973, p. 6)

Furniss also examines the role of prior service as it results in credit toward tenure service:

> In 1971-72, a sample survey indicated that 54 percent of the nation's institutions granted no credit for prior service, 25.5 percent granted up to three years, and the remainder used longer or shorter periods. The institution now granting three years toward a probationary period of seven years has to make its tenure decision by the end of the third year of service on its campus (the third year in which the faculty member occupies one of the campus' nontenured positions). (1973, p. 6)

Both credit and years of service at the current employing institution are discussed by Springer (1951) in an older statement regarding criteria for advancement at the University of Southern California, a private institution. The criteria, adopted by the president of the university, include:

(1) Training and experience prior to coming to USC--A faculty member is appointed or promoted to professorial rank, i.e., assistant, associate, or full professor, normally only after he has obtained the higher degree appropriate to his field, such as the Ph.D. in the letters, arts, and sciences. A faculty member whose higher degree was conferred upon him by this institution, commonly is appointed or promoted to professorial rank only after he has had substantial experience in his field elsewhere. Promotion is made upon merit demonstrated at this institution, rather than upon previous performance elsewhere....

(2) Years of service at USC--There is no minimum period of service within each rank prior to promotion. Years of service alone are not considered as a positive factor counting toward promotion. (1951, p. 117)

The 1940 Statement of Principles on Academic Freedom and Tenure refers to the issues of prior service and current term of employment in combination:

> Beginning with appointment to the rank of full-time instructor or a higher rank, the probationary period should not exceed seven years, including within this period full-time service in all institutions of higher education....(Reprinted in Keast and Macy, 1973, p. 229)

Committee A on Academic Freedom and Tenure reconfirmed this stand of the American Association of University Professors in 1977. The Committee states further:

> It is particularly opposed to belated arrangements not to count prior service which are made in order to avoid an impending decision on tenure. (1977, p. 230)

Their stand is tempered somewhat, however, by the following:

> The Association recognizes, however, that in specific cases the interests of all parties may best be served through agreement at the time of initial appointment to allow for more than four years of probationary service at the current institution, whatever the prior service elsewhere. (1977, p. 230)

Since 1975, stochastic models have been published which treat the tenure trait as strictly one of probability based upon number of years in the higher education system as a member of the faculty. Stochastic, or time series, modeling allows the researcher, upon assuming steady-state relationships, to examine what the population of interest will look like in a number of time periods.

Johnson (1978) used an iterated stochastic model to project faculty flow and tenure proportions, determining the tenure-granting rate, T, to be equal to the percent of untenured faculty, employed at the same time, that eventually receive tenure, as a function of the average number of years spent in nontenure status. Johnson promoted his stochastic model as one way to test the effects of new policies related to higher education management.

Radner and Kuh (1977) looked at tenure as an economic variable. Using the vocabulary of stochastic processes, they state:

> The question addressed here is how, as an economic variable, tenure has changed as conditions in the academic labor market enters a period of what may, at best, be called the "steady state." (1977, p. 1)

Their model defines tenure rate in terms of conditions specific to a particular year ("date" effect) and time that has elapsed since

the faculty member obtained the Ph.D. ("age" effect). The "age" effect is used, they state, because:

> Time since the Ph.D. is presumably correlated with the accumulation of those things upon which the decision to grant tenure is based: publications, teaching experience, reputation, etc. (1977, p. 4)

Their statistical model was applied to information from the 1973 ACE Survey of Teaching Faculty, which surveyed the period 1955 to 1973. They conclude,

> ...the tenure rate did behave as an economic variable in the sense that higher tenure rates occurred at the same time as the rapid increase in employment in academia....In private institutions, which were relatively harder hit by the declining rate of increase in enrollments in the late 1960s, we see quite rapid downward adjustment of tenure rates at the same time. (1977, p. 23)

The following qualifications are also offered:

> (1) This survey is based on faculty <u>within</u> academia. Faculty that have left academia because they were not granted tenure...will lead to overestimates of tenure rates, particularly for older faculty cohorts.
>
> (2) The change in quality of faculty members by cohort is not considered. Until the market adjusts to this higher level of quality...by raising standards of promotion...a greater chance of promotion (will exist) not because of "the market" but because they are perceived as "better" cohorts. (1977, p. 23)

Perhaps acknowledging the potential negative effects their model might generate, or perhaps just as a peace offering to those offended by the variables used in the model, Radner and Kuh state:

> We feel that considerations of academic freedom alone are sufficient to justify its (tenure's) continued existence....The results presented in this paper show that tenure has indeed behaved as an economic variable. (1977, p. 1)

Kuh also compared the results of the 1973 ACE Survey with the results from the 1975 Carnegie Faculty Survey using the stochastic model mentioned earlier. The 1975 survey resulted in lower median times to tenure for earlier years. Kuh acknowledges,

> ...it appears that the differences result from systematic differences of the incidence of tenure for the older cohorts. At any age, the older cohorts in the 1975 sample are more likely to be tenured than the older cohorts in the 1973 sample. (1977, p. 4)

Kuh discussed the "date corrected median time to tenure for year T" as an estimate of years until tenure of "the cohort that entered academia in year T if conditions did not change thereafter."

> (1) Median time to tenure is almost always longer in private universities than in public universities;
>
> (2) Median times to tenure in universities fall rapidly during the years 1961-65, and are minimum in 1968; thereafter, however, they rise steadily to 1974;
>
> (3) For public four-year colleges, the median time to tenure is still falling; but for private four-year colleges, the median time to tenure rises after 1968;
>
> (4) Humanities demonstrate a shorter time-to-tenure in both public and private universities;
>
> (5) Postdoctoral fellowships in the sciences delay entry into tenure track positions and thus lengthen the median time-to-tenure. (1977, p. 10)

Kuh analyzed the 1975 data and determined a "questionable" group of faculty who reported receiving tenure at the same date as they began service at their current institution. This "questionable" group made up 14 and 15 percent of the tenured sample in public and private universities respectively. A "correction" based on the assumption that these faculty were awarded tenure for the first time upon beginning at their current institution provided an upper bound; and a lower bound was found by eliminating the "questionable" group from the sample. Kuh concludes:

> It can be seen that the effect of this correction is to draw the 1973 and 1975 estimates much closer together. The difference between the corrected and uncorrected 1973 estimates is largest for the years prior to 1964. The "error" caused by "misreporting" of the first date of tenure is larger for the earlier cohorts, whose respondents are much more likely to have moved with tenure. After 1968 or 1969, the corrected estimates are very close to the uncorrected estimates. (1977, p. 34)

Kuh also suggests that attrition among faculty may work in a way that responds to market conditions:

> For <u>all</u> the older cohorts, a higher proportion of the 1975 sample was given tenure in <u>all</u> years up to the eighth after receiving the Ph.D. Chi-square tests for each cohort also indicate that we must reject the hypothesis that the two distributions of time to tenure could have come from the same population. . . . Not only were these cohorts around in the 1960s when the time to tenure fell due to market conditions, but those in the 1975 survey were more likely to receive tenure at an earlier age, regardless of the date on which it was received. Had the older people who were less good left academia between the samples? Were early retirement programs working? . . . We don't know. If it were true, however, that attrition as well as the tenure rate

> behaves in a way that responds to market conditions, as we suspect, it would be an interesting finding with the implication that the academic labor market, in fact, responds in numerous ways to the change from growth to the steady state. (1977, p. 35)

Lamson et al. (1974) also discusses stochastic models of tenure award. Two such models are presented in detail, based on faculty with a "uniform age distribution" as versus an "uneven age distribution." Referring to any tenure policy as "P," and proportion of new hires as "H," Lamson reports:

> The P - H trade-off over time should be grossly of the form: the number of new hires in any given year must equal the sum of the retirements that year (externally given from the age distribution) suitably corrected for other sources of attrition, the number of quits that year, and the number of up-and-outs that year (or 1 - P, the probability of not receiving tenure) times the number of new hires of six years earlier. Obviously, if new hires equal retirements plus tenure and non-tenure-related attrition in every year, faculty size will remain constant, and if one wishes to raise H, given retirements and quits, tenure-related attrition must rise through the application of stricter tenure standards (a lower P). (1974, p. 16)

Lamson proposes the following "dynamic option":

> ...experiment with a continued high P level and lower H levels combined with new hiring at what Furniss calls "the ages of least concentration", i.e., hiring older, tenured faculty members rather than the traditional, fresh-out-of-grad-school 28 year old....Thus, if the school began hiring costly 40 and 50 year olds now to fill the retirement and up-and-out vacancies of the next five to ten years, it would be assured of a much higher level of new younger hires in 15 or 25 years when the current tenured age bulge had moved on to the point that it was seriously restricting H. (1974, p. 23)

Another mathematical model is presented by York College of Pennsylvania (1977), subsequent to the president's recommendation that tenure and term contracts both be initiated. The purpose of this was to maintain 50 percent tenured ratio within departments, but also to aid the faculty member through the job security of a term contract while nontenured. This contract stipulated that after each year of successful work at the college, and if there are no enrollment problems, the faculty member automatically has another three-year contract (thus called a "rolling contract").

Subsequent to presentation of the mathematical model, the statement is made:

> . . .if we wish to maintain a fifty percent tenure ratio and we have a five percent growth rate, we will have to have a policy that allows for a net change of tenured positions of three percent. . . . The ratio of those on tenure must be the same as that between the percent net change in tenure to the percent growth. (1977, p. 50)

One of several recommendations resulting from this study is:

> . . .the probationary period should be seven years for all new appointments regardless of previous experience. (1977, p. 52)

Hopkins and Bienenstock (1975) present a faculty planning model using stochastic techniques at Stanford University. They state their purpose as

> . . .to predict the number of new positions, age distribution, and so on based on assumptions concerning appointment and promotion practices. . . . We believe that tenure and promotion decisions must be made with a knowledge of the probable short-term and long-term consequences. (1975, p. 24)

Applying their numerical model to Stanford University's School of Engineering and School of Humanities and Sciences, the following assessment is made of past promotion practices at Stanford:

> . . .a longitudinal study of recent appointments to untenured positions was made in spring 1974. Assistant professors whose appointments began during the four-year period from September 1964 to September 1968 were tracked to determine the fraction who ultimately achieved tenure in each school. Faculty hired during 1967-68 were the latest group included in this study because promotion decisions would not have been made for many of those hired later. The results of this study. . .indicate substantial differences in past promotion rates between schools and even between the three subgroups within the School of Humanities and Sciences. The most important results, in the context of this article, are that 39 percent of the Humanities and Sciences and 56 percent of the Engineering junior faculty ultimately acquired tenure. (1975, p. 31)

One finding presented by Hopkins and Bienenstock which reflects negatively on studies reviewed earlier, relates to the interaction of appointments to tenure and the turnover rate:

> The analysis indicates that hiring proportionately fewer faculty into tenure will actually <u>decrease</u> turnover whenever the promotion fraction is greater than 0.4. Thus, if an institution is making few appointments to tenure, but is promoting a large fraction of its junior faculty, the average length of service per faculty member is large and the turnover rate is, consequently, reduced. (1975, p. 29)

This is bad, according to the authors, because:

> The desire to maintain flexibility and the flow of junior faculty leads to the conclusion that very few faculty members should be appointed or promoted to tenured positions. (1975, p. 24)

Noting that present rates of promotion or appointment to tenure are causing the tenure ratio to "creep upward significantly (and with it the faculty salary budget)," Hopkins and Bienenstock (1975, p. 44) recommend that the tenure appointment and promotion rates approach 20 percent. They maintain that this is not a quota, but instead:

> . . .we have asked each department and school at Stanford to consider each appointment or promotion to tenure in the context of the long-term future of the department and with the understanding that the department faculty size is not likely to grow. (1975, p. 44)

Regarding the influence of any change in administrative policy, however, the authors point out:

> . . .any change in policy tends to have a transient effect that lasts approximately three to four years. After that time, the projections settle down close to their equilibrium values. (1975, p. 33)

The research summarized above, along with studies of less recent data (LaSalle, 1972; Oliver, 1969; Kemeny, 1972), views the decision to award tenure as one mainly determined by probabilities generated by years of experience within academia. Older studies relate tenure status as predicted on the basis of rank alone; these newer studies use years in the system and age as predictors. The synthesis of "experience" and "merit" variables as predictors is given only passing reference, and left basically undefined.

Walters adds:

> The percentage of probationary appointees achieving tenure is dependent upon the care exercised in original faculty selection. (1971, p. 3062)

Similarly, Byse and Joughin state:

> Tenure is based in part on retention; retention is based in part on evaluative standards....The best practices with regard to standards for acquisition of tenure should be studied and generally embodied with appropriate local modifications. (1959, p. 141)

This section has reviewed literature related to the "retention" aspect of the tenure award decision. There are two issues involved in the "retention" literature: (1) the length of the probationary period, and (2) the amount of credit for prior service. Probationary periods have increased during the last twenty years, from an average of 4.2 years to approximately 7 years. By contrast, although granting of credit varies greatly by type of institution, the literature reviewed here indicates that the policy of the majority of institutions has been and remains to be to grant no credit for prior service. Although the 1940 Statement of the AAUP requires a decision based on experience totaling seven years in all institutions of higher education, the 1977 AAUP position is that the critical factor in determining the retention period is the agreement at the time of initial appointment. "Evaluative standards" are discussed next.

Meritorious Performance and Tenure Award

> As for the nature of the standards, a bringing-together of all the qualities deemed desirable in all these institutions produces something like an index to the aspirations of American higher education: advanced degrees; teaching experience and teaching power; proved

> research capacity; publications; attendance at and participation in professional society meetings; committee work and other kinds of intramural faculty service; effective personal relations with campus community; service to the local general community and to the nation; and national reputation. (Byse and Joughin, 1959, p. 29)

These same and similar criteria for advancement and tenure award have been cited by many authors. For example, in an older work, Bosley lists the upper fourth of ranked criteria used by state teachers' colleges:

> ...ability to work with students in extra-class activities, outstanding work as a teacher, professional recognition in the region served by the institution, additional work toward a higher degree, activity on faculty committees, securing the doctorate, personal enthusiasm, and statewide recognition in the field of specialization. (1946, p. 23)

The criteria ranked in the lower fourth of Bosley's survey are:

> ...membership in learned societies, amount of published work, public school experience, religious attitude in accordance with that generally accepted in American life, increased family and economic responsibility, invitation to accept another position, and participation in the work of the church. (1946, p. 23)

The 1950 faculty evaluation in use at Minot State Teachers College is presented by Norem (1950). The faculty created an evaluation schedule organized into four divisions:

(1) evidence of scholarship and scholarly attainment;

(2) evidence of professional services to the college;

(3) minimum requirements for appointment to each academic rank; and,

(4) modification of minimum requirements. (1950, p. 24)

These divisions incorporated rating scales to be used by colleagues in rating each other, and a student rating scale to incorporate a direct evaluation of the staff member as a classroom instructor.

Larabee (1955) examined several sociodemographic variables of 58 administrators who, between 1925 and 1950, were crucial in tenure denials as reported in the AAUP Bulletin. Larabee concludes that the administrators were significantly different from a randomly selected control group in that the administrators originated from "low density, Southern, non-doctoral backgrounds" (1955, p. 1192).

In 1958, Pfnister listed the "most frequently mentioned" criteria for award of tenure:

(1) highest earned degree,

(2) effectiveness of teaching,

(3) research and scholarship,

(4) service to the community and usefulness to the college, and

(5) years of service and experience. (1958, p. 269)

Usher (1966) outlines the evaluation procedure of the college of education at one southeastern university. Research and publication activity of each faculty member was submitted by the faculty member to the dean. Based on this report, the dean assigned a score ranging from zero to four, reflecting the dean's judgment concerning the quantity and quality of the work accomplished. Usher also observed the classroom behavior of 27 professors, each of whom had volunteered for the research, and was allowed access to the most recent evaluations

of the 27 subjects by the dean of the college. Finally, student evaluations were also gathered on all faculty in this study. Pearson product-moment correlations between all variables were examined.

In Usher's study, the evaluation instrument used since 1958 for salary and promotional decisions by the college dean was based on a point-scale formula summation of the following five factors:

(1) teaching, counseling, and ability to work with colleagues, as evaluated by the department head;

(2) research and publications reported on the annual report of the staff;

(3) participation in professional activities--serving as committee chairmen or officers in professional societies, serving as consultants or speakers for professional groups;

(4) overall evaluation by three teaching members of the faculty; and

(5) special adjustments by department heads and the dean. (1966, p. 43)

Although Usher's findings revealed significant correlations between student evaluations and five perceptual hypotheses (i.e., perceives others as (1) able, (2) worthy, (3) dependable, (4) internally motivated, (5) perceives self as wanted), there were no significant correlations between the perceptual hypotheses and any of the above evaluative criteria for salary and promotional judgments.

Several of the evaluative criteria in Usher's study were significantly intercorrelated:

(1) student ratings X department head ratings (r=.48),

(2) department head ratings X research and publications (r=.54),

(3) professional activities X research and publications (r=.72).

Luthans' study, mentioned earlier with regard to tenure award in practice, also researches specific objective faculty evaluation methods. Two such methods were publications and teaching reports. The respondents include:

(1) all presidents and vice-presidents in charge of academic personnel;

(2) all deans of business schools in the population, and a systematic sample of one department head from each school of business; and,

(3) a systematic sample of three faculty members from each school of business, representing

(a) full professors who had been promoted within the past five years;

(b) associate professors from all areas of business administration; and,

(c) assistant professors also selected to represent all areas of business administration. (1967, p. 39)

Luthans presents a comparison of group differences regarding evaluative criteria of publications and teaching, which is summarized by the current author in the following table.

TABLE 2-3
FACULTY EVALUATION CRITERIA

Method	Admin.	Deans	Dept. Heads
(1) current bibliography maintained.	51%	57%	43%
(2) publications and research reports available.	49%	54%	38%
(3) objective teaching reports are used.	34%	29%	27%

Few differences exist between central (university) and decentral (college level) administrators regarding weights to be attached to various promotion criteria; faculty members, however, weighted items somewhat differently, as is shown in the next table.

TABLE 2-4
PROMOTION CRITERIA--AVERAGE PERCENTAGE WEIGHTS

Criteria	Admin.	Deans	Dept. Heads	Faculty
(1) personal characteristics	12%	13%	12%	14%
(2) seniority	9	10	8	14
(3) service	12	12	13	10
(4) research activity	35	33	34	38
(5) teaching effectiveness	27	27	28	16

Faculty disapproval of the current promotion policies in Luthans' study was widespread. Luthans found no significant pattern when the ranks and publication records of those faculty were considered. He concludes:

> Evaluations based only on recommendations from below are inadequate. To serve an effective evaluation function, administrators should utilize a consistent independent method of evaluation to supplement current bibliographies. Reading faculty publications, accumulating book reviews, ranking the relative importance of various journals in each field of study, noting the quantity or distribution of books and articles, and utilizing objective teaching reports are not widely used by central and decentral administrators. (1967, p. 87)

"Research activity and recognition" was found to be a strong factor when principal components analysis of colleague ratings was performed by Wilson et al. (1973). A mailed questionnaire, sent to a random sample of teaching faculty, asked the respondents to name and then evaluate a colleague whom they regarded as "the most effective" on the basis of a 113 item questionnaire. Only 58 of the 110 respondents had observed the classroom behavior of their nominee, so those items concerning classroom teaching and speech-giving were not included in the data analysis.

The following five components were derived in Wilson's study:

I. RESEARCH ACTIVITY AND RECOGNITION: Is well-known and highly regarded for his scholarly activity, publications, and research. Confers with colleagues about research and keeps abreast of recent developments in his field.

II. PARTICIPATION IN THE ACADEMIC COMMUNITY: Attends and participates in campus lectures, social functions, and student-oriented activities. Maintains a congenial relationship with colleagues.

III. INTELLECTUAL BREADTH: Has broad knowledge both within and beyond his field. Is sought out by students and colleagues for information and academic advice.

IV. RELATIONS WITH STUDENTS: Maintains an informal and congenial relationship with students beyond the classroom. Is consistently available to students for consultation about personal and academic concerns.

V. CONCERN FOR TEACHING: Expresses concern for teaching and consults with colleagues about issues related to teaching. (1973, p. 34)

Analysis of variance and Scheffe tests for post hoc comparisons were performed on standard scores derived for each nominee, who was assigned to a group based on academic rank. No significant differences were found between the ranks on the scales for II, III, IV, and V; professors scored significantly higher ($p < .05$) than the other two groups on scale I, Research Activity and Recognition.

Wilson also analyzed the respondents who did the nominating. Relationships between their rank, disciplinary area, age and years of teaching experience and the five scales were examined--with no significant findings.

Smith and Fiedler (1971) critically reviewed the literature concerning the measurement of scholarly work, a frequently mentioned criterion for acquisition of tenure. In reference to individual performance measures, the authors point out that ratings are

usually based on publications without the benefit of critical evaluation of the writings. The authors contend that therefore "rating is a measure of reputation" (1971, p. 228).

Several other studies quoted by Smith and Fiedler indicated correlations of .61 and .76 (Harmon, 1963) between publication quantity and a rating criterion of individual physical and biological scientists, and of .20 (Meltzer, 1949) between number of publications and "the eminence of the institution granting the Ph.D." Fiedler and Biglan (1969) found a correlation of -.13 between American Council of Education ratings of a department's quality and the average number of books published by faculty members of the department, whereas a correlation of .52 was found between ACE department ratings and the average number of journal articles published by the department's faculty.

Smith and Fiedler suggest using the number of citations an individual's work received in the literature during a given period as a rating of significance which is unobtrusive. The Science Citation Index and Psychological Abstracts were exemplary sources, types of publications probably unavailable for some fields. Smith and Fiedler conclude:

> ...citations may provide as unbiased a measure of quality as is possible. (1971, p. 228)

Crane (1965) examined the relationship of research productivity and recognition. Measurement of recognition was based on post-doctoral fellowships, service on journal editorial boards, membership in associations, etc., while productivity was measured by the number of publications. A significant relationship was found between recognition and prestige of the current academic affiliation (no measurement of prestige was indicated), whereas no significant relationship was found between recognition and productivity.

Cole and Cole (1967) were also referenced by Smith and Fiedler for a study of physicists which found that journal quality accounted for 44 percent of the variance in number of awards received by physicists, while addition of a "quantity" factor did not increase the variance explained.

In summary, Smith and Fiedler state:

> ...an adequate evaluation of performance probably requires several criteria. No criterion measure currently available is sufficiently well established to stand alone. Measures of eminence, productivity, recognition, and journal quality can be useful to the educational researcher, and a scholar's scores on these dimensions should be compared and evaluated. But the citation measure seems to be least contaminated by such factors as the prestige of the scholar's department or university or the sheer number of published papers. (1971, p. 232)

A paper presented to the American Educational Research Association by Scott et al. (1977) discusses factors influencing professorial assessment. Four hundred teaching and administrative

faculty were selected from the Oregon State System on either a random or stratified basis. They were asked to respond to the following four questions:

(1) What factors are considered in the assessment of faculty performance?

(2) What evidence is utilized in professorial assessment processes?

(3) What weights are assigned by faculty to factors considered relevant to teaching, scholarship, and service when a decision is impending regarding a faculty member's promotion or tenure status?

(4) What factors should be influential in promotion or tenure decisions? (1977, p. 2)

Of 34 items listed, university faculty ranked the variables of publications, student ratings, service on departmental committees, and evaluation by departmental chairman as most important factors assessed with regard to tenure status decisions. Ranked lowest were obtaining an advanced degree, formal colleague appraisals, supervision of theses, and memberships in professional organizations. This ranking was contrasted with that obtained from college faculty.

College faculty ranked the following items as most important:

(1) formal appraisals by off-campus peers

(2) formal appraisals by colleagues

(3) supervision of theses

(4) student ratings

(5) time in academic rank

and least important:

(1) informal colleague appraisals,

(2) grant support for research,

(3) evaluation by school or departmental committee, and

(4) consultation record on and off campus. (1977, p. 5)

In general, Scott et al. suggest, evidence of student learning and assessment of course syllabi were considered uninfluential clusters of items. Factors considered presently influential but not preferred included the following:

I. University Faculty

(a) evaluation by school or departmental committee

(b) time in academic rank

(c) evaluation by department chairman

(d) public presentations of projects

(e) service on departmental committees

(f) informal colleague appraisals

(g) service on institutional or systemwide committees

II. College Faculty

(a) publications

(b) service on departmental committees

(c) formal colleague appraisals

(d) obtaining advanced degree

(e) time in academic rank

(f) evaluation by school or departmental committee

(1977, p. 6)

Another recent study of factors regarded as merit indicators from the Oregon State System of Higher Education was published by Thorne (1977). Administrators, faculty, and chairpersons were asked to respond to the Faculty Perception Questionnaire. One discovery was that faculty from different fields ranked different items as most influential in tenure decisions. Physical and natural science faculty at universities ranked obtaining grants as most important; social science faculty at universities ranked formal appraisal of teaching by colleagues as most influential. Administrators believed these were important, but were "discouraged with what was presented in dossiers relevant to such performance." (1977, p. 28)

Thorne states:

> Our findings have repeatedly shown that a very limited number of criteria and review sources should satisfy (a) the reality of making decisions (decision makers do not utilize dozens of variables in making a choice, even though they may think they do), and (b) the preferences of faculty, who have said in the study that they would prefer to be judged with systematic, product-oriented evidence. (1977, p. 58)

In a longitudinal study, Perney (1977) examined the relationship between faculty remaining with or leaving the university and their compliance with departmental grading and publishing practices. Data were gathered for six years, from the beginning of the faculty member's university career to the year in which a tenure award decision was made.

Perney used a sample of 33 male full-time faculty beginning as assistant professors on the campus during the academic year 1968-69. Both university lists of faculty publications and departmental publishing lists were used as sources of publication data. For grading data, the university registrar's grade distribution lists for each faculty member were averaged. To determine departmental cohesiveness, two university deans ranked the departments according to Golembiewski's definition of cohesiveness. Departmental size was based on the six-year departmental median size as determined by the university catalog. Faculty rank was also determined by using the university catalog.

Perney's publishing index was defined as the standardized signed difference between the number of articles an individual published per year and the median number of articles published by his department. The grading index was standardized by determining the signed difference between the faculty member's mean undergraduate grade assignment and the mean course grade given by other members of the respective department, divided by the standard deviation of all course grades given within a particular department.

Perney used discriminant analysis to test the relationship between compliance and remaining with or leaving the university. Two groups were determined, (1) drop-outs and (2) continuing. Criterion measures used were the publishing index and the grading

index for the faculty member at the end of his second year of service with the university.

A significant difference was found by the end of the second year of service between the two groups in grading and publishing behavior. Faculty members who conformed more to their departmental grading practices within the first two years of service remained with the university. With regard to publishing, however, Perney states:

> Those who remained with the university tended to deviate more from their departmental publishing practices within the first two years of service than those who eventually left...(but) faculty in both smaller and more cohesive departments appeared to have complied more to publishing practices of their departments than faculty in both larger and less cohesive departments. (1977, p. 10)

By far the majority of studies reviewed above assessed opinions of faculty regarding which criteria are most influential in promotion decisions. Most sources cited here equate tenure qualifications and promotion qualifications; this review has assumed this same equivalence. Regarding actual differences existing between faculty across disciplines on these evaluative criteria, however, only one study reviewed here has shown a significant finding--Wilson et al. (1973) found that professors scored significantly higher than other ranks on a scale of Research Activity and Recognition. Yet, the bulk of faculty opinion is that research weighs most heavily when evaluative decisions are made, and, when asked, most administrators concur.

Caplow and McGee offer one possible explanation for this seeming divergence:

> ...if (one) is able to publish at all, however, he is not impossibly handicapped, since the actual number of publications necessary to meet tenure requirements at most universities is not large. (1958, p. 82)

Logan Wilson confirms this explanation:

> The much-discussed publish-or-perish dictum, however, is in actuality more fiction than fact in the average institution....In all except a few leading institutions less than 10 percent of the faculty accounts for more than 90 percent of all published research. (1967, p. 104-105)

Lazarsfeld and Thielens (1958) studied 2,451 social scientists and found that only 1,377 of them had published three or more papers and that only 861 had published a book other than their dissertations. (1958, p. 397-398)

In 1973, Yoels found that, from twenty departments of sociology chosen at random, 47.5 percent of those faculty who had been promoted had published one article or less and only 12.5 percent had written a book. (1973, p. 128-130) Luthans (1967) similarly reports that advancement in rank is not always preceded by publication, and in approximately 40 percent of the cases when faculty members move to the rank of associate or full professors, they did so with three or fewer articles and no books.

Another 1973 study, by Siegfried and White, analyzes the effect on salaries of research and other university services.

Using a regression technique, they derive incremental values of salary related to the significant variables. Holding a major administrative position, such as departmental chairman or director of a research institute, was "worth" over five thousand dollars in salary. An article in one of the six national journals for the faculty's field (economics) was valued at $345, each additional year of experience had a value of $253, and quality teaching as determined by student ratings had a value of $732. (1973, p. 313).

Student ratings of faculty are discussed by some researchers. The literature reviewed to this point indicates that such ratings do not hold as much influence in decisions of tenure award as do other factors, most notably research activity and publications. Guthrie, for example (1949), found student rating intercorrelations (i.e., agreement or consistency among students rating a faculty member's teaching skills) of .89. By contrast, the correlation between student rating scores and colleague rating scores was .48. He concludes that this contrast indicated "a radical difference" between the two measures.

Guthrie also compares teaching effectiveness and research contribution:

> Between teaching effectiveness, which is judged with high consistency, and research contribution, which is judged with still higher consistency, there is no significant association. This was a matter of great surprise. Most college teachers believe that teaching and research contribute each to the other to an extent which should be evident in the correlation between the two. (1949, p. 379)

Almost 25 years later, Aleamoni and Yimer (1973) investigated the intercorrelations between student ratings and colleague ratings. Using 474 faculty members' evaluations by students, they found a correlation of .27 between student and colleague ratings. Furthermore, student ratings did not significantly correlate with the number of publications of a faculty member. These 474 faculty members had been nominated as "good teachers" by their colleagues. The correlation between this colleague rating and academic rank was .20.

McKeachie's review of research (1973) indicated that instructor characteristics such as knowledge of subject, knowledge of teaching, experience, sex, and rank have no significant effect on student ratings.

Arguments against using student evaluation of teaching effectiveness have usually centered on the transience of the student, the student's immaturity regarding evaluative measures, and the interaction of evaluation of teacher by student and evaluation of student by teacher. Jaeger and Freijo (1974) investigated this last argument: whether or not students could discriminate teaching ability regardless of their personal benefit from the instruction. A student evaluation instrument was analyzed by principal components analysis to describe the relationship between students perceptions of their benefit from instruction ("outcome" components) and their instructor's teaching quality ("process" components). Five components evolved which the authors determined were pure orthogonal

factors and reflected either "process" or "outcome" factors without internal contamination of types of items. They concluded that "process" and "outcome" were independent, thus indicating that the students could discriminate teaching ability regardless of their personal benefit from the instruction.

Through discriminant analysis of a 10-item student evaluation instrument used with one arts and sciences college within a large Southeastern university, James (1975) confirmed that tenured and nontenured professors differed significantly on the rating scale. Specifically, nontenured faculty received better ratings than tenured faculty, and associate professors as a group received better ratings than either full or assistant professors. James concluded that the role of a student evaluation was slight in determining the tenure status of faculty members.

This section has reviewed the available literature on three areas of faculty performance typically regarded as meritorious: research productivity (publications), teaching effectiveness, and service. Most studies examining the importance of research productivity and publications are based on faculty opinion. Although most faculty react unfavorably to publication-based evaluation, they believe it is a powerful element of the decision to award tenure. Studies assessing the records of faculty research productivity and publications contradict faculty opinion; instead, they demonstrate that a minimal number (less than three) of journal articles is listed on most faculty vitae.

"Service" is mentioned by faculty from both colleges and universities as another activity influential in the tenure-award decision. Again, faculty members believe this criterion should not be as important as it is. Studies of the influence of "service" on the decision to promote a faculty member show no significant relationship between "service" and either promotion or tenure award.

Finally, student evaluation studies have found that the decision to award tenure is not influenced significantly by student evaluations of instruction. One study indicated that students could discriminate teaching ability apart from their actual learning, and another study showed that nontenured faculty members were rated as better instructors than their tenured counterparts.

The next section focuses on available literature regarding affirmative action in the faculty ranks, specifically focused on academic women.

Academic Women and the Award of Tenure

> Females are not an insignificant minority in the academic world; though their proportion is only two-thirds of what it was at its peak in the 1930s, they are about one-fifth of those in university and college teaching, being primarily situated in the latter. Although in the late 1960s and early 1970s considerable attention has been given to increasing this proportion, one study conducted by the American Council on Education revealed that between 1968 and 1972 their representation rose from 19.1 percent to only 20.0 percent. (Lewis, 1975, p. 123)

Literature reviewing the status of academic women has increased during the past decade. Most publications in this area remain essays of opinion and interpretations of census-like surveys.

Brown (1967) reviewed recruiting in the nation's top 10 percent universities, and estimates the percentage of female faculty which could be expected at these universities based on the publication rate of women when compared to the publication rate of men. Brown expected to find 12.7 percent of the faculty at these institutions to be female, on the basis of his figures. The actual percent of women was 8.8 percent. Brown found this trend to be identical in the top 60 percent of institutions he studied, and concludes that they employ:

> . . .too few of them (women), even after accounting for their differential research productivity. (1967, p. 79)

Astin and Bayer (1973) analyzed data to assess the degree of sex discrimination in academic rank, tenure, and salary while controlling for individual background characteristics, professional activities, and work settings. The source of their data was a sample of 3,438 women and 3,454 men responding to a questionnaire circulated by the American Council on Education and the Carnegie Council on Higher Education. The procedures followed were stepwise multiple regression, a separate equation being generated for men

and one for women followed by a comparison of the different significant variables. They conclude:

> Length of time with the same institution and rank were the most significant predictors of tenure for both women and men. Once rank was controlled, it was found that persons employed at two-year institutions were likely to obtain tenure sooner than persons employed at four-year colleges or universities. In fact, for both sexes, employment at a university was negatively associated with ease in achieving tenure. (1973, p. 348-350)

Astin and Bayer also compare rank predictors for academic men compared to academic women. They conclude:

> For both women and men, the doctorate degree, years of employment in academe, productivity as measured by published articles and books, time spent in administration and years employed at the current institution, were among the most important variables in predicting high rank. Deterrents to rank advancement that handicap both sexes are employment at two-year institutions and teaching the humanities. . . . No single factor approaches the level of significance for the success of academic women as the possession of a doctorate, whereas for men, publications and number of years spent in academe reach about the same level of significance as the doctorate. (1973, p. 346-348)

A study using multiple regression was conducted by Loeb and Ferber (1971) which focused on predicting rank and salary of faculty members, using sex as one independent variable. A multiple R in the mid-.80 range was achieved for both predictions, and sex was a significant variable in both equations. Females were found to receive 7 percent less salary per year, with all other variables held constant. Similarly, the prediction of status indicated that sex-based discrimination in rank was present, since sex added

significantly to the prediction after the other variables had been used. The sample was from the University of Illinois. The existence and extent of sex-based inequality in pay and discrimination in academic rank was defined as being present if:

> ...sex as an independent variable adds significantly to the predictability of salary and rank after the average salary for S's department and rank, and indices of merit and experience, such as publications, honors, etc., have already been used as multiple predictors. (1971, p. 240)

The authors conclude:

> Correction of rank inequities will probably be an even more complicated process, demanding in all likelihood departmental explication of promotional procedures so that the presence or absence of discrimination can be judged with some approximation of objectivity....In short, the present data document the existence of discrimination against women in pay and suggest discrimination in rank as well. (1971, p. 243)

Hines and Toppe (1975) generated a multiple regression equation to predict college faculty salaries from twenty variables of career-long data on 23 faculty members in one large department of a Southeastern university. The high predictability of salary from the twenty variables ($r = .9808$) led the authors to conclude that, at least for this department, there were no gross inequities present in current salaries. Sex was found to correlate -.127 with 1973-74 nine months' salary (being male correlates negatively).

The Committee on Governance of Harvard University (1972) admitted there was a significant lack of women on their Arts and

Sciences faculty and modified their hiring policy to attain a 9.6 percent target for women tenured professors within the decade. The Committee states:

> ...the normal turnover (apart from unanticipated resignations) will vacate within the next decade roughly 30 percent of the permanent appointments in the Faculty of Arts and Sciences. (1972, p. 66)

Since its faculty could afford to schedule regular appointments to tenure, no difficulty in reaching the target was anticipated.

Morlock (1973) examined tenure patterns on a national scale, to ascertain the proportion of faculty with tenure by sex. She notes:

> Nationally, about half of all faculty men, but only 38 percent of all faculty women occupy tenured positions. The proportion of men with tenure is lowest in four-year colleges and highest in universities, while the proportion of tenured women is highest in two-year colleges and lowest in universities. (1973, p. 274)

Scholarship and productivity rates for academic women were studied by Bayer (1970). In a national sample of faculty, women were likely to have lower rates of scholarly productivity than their male colleagues. At the extreme of productivity, 11 percent of the men versus 2 percent of the women published twenty-one articles or more. Thirty-nine percent of the men compared to 63 percent of the women published no scholarly articles at all. (1970, p. 15).

Morlock argues:

> Nationwide studies of faculty members have found that women spend considerably more time in teaching than their male colleagues who are more likely to combine teaching duties with research or administration. (1973, p. 281)

Robinson (1973) reviews the following national survey results from 125 campus reports:

> Connecticut College found that at each rank women were more likely than men to have had the doctorate when they were first appointed. Yet women had spent more time at each rank than men. Furthermore, women doctorates waited an average of four and a half years longer than men doctorates before achieving the rank of full professor. A similar trend was found at the University of Washington. Doctorate and nondoctorate women hired below the rank of assistant professor waited twice as long as their male counterparts for promotion to assistant professor. The average length of time at the assistant professor rank since appointment or promotion was about twice as long for women, considering the date of appointment for those with the doctorate or the number of years since the degree was completed for those hired without the doctorate. (1973, p. 215)

Robinson concludes:

> To date, no definitive study has been conducted which takes into account the various indices of merit. Still the weight of evidence which exists provides a great deal of support for the notion of differences in promotions as a function of sex. Because of the importance of promotions to one's academic career, it seems imperative for institutions to investigate the topic in more detail. (1973, p. 218-219)

Summary

To restate the arguments surrounding the award of tenure:

(1) The tenure system, especially in times of financial crisis, diminishes the institution's opportunity to recruit and retain younger faculty. In this respect,

the system operates to the disadvantage of new entrants into the profession and makes it especially difficult to expand the representation of women and minority groups in faculties.

(2) The tenure system leads to diminished emphasis on quality undergraduate teaching, because tenured professors prefer to concentrate on their own research and because, in the bestowal of tenure, research accomplishment is more easily measured than good teaching. The professional reward system, in the tenure context, thus fails to serve institutional and social needs.

(3) The tenure system puts the young faculty member under undue pressure to demonstrate his qualifications.

The argument concerning the constraint tenure practices have put on women is confirmed by many studies cited in this chapter. The interactions between tenure status, sex, teaching, research, and service are still unclear, but the evidence indicates that something other than tenure is restraining recruitment and retention of women faculty.

"The institution's opportunity to recruit and retain younger faculty" is also said to be diminished by tenure systems. The Commission on Academic Tenure (1973) found age of faculty member to be significant in expressed attitude regarding institutional governance, but that tenure status was as important as age in determining differences. Younger professors, tenured and nontenured, were more likely to be dissatisfied with the institution's decision-making process. No longitudinal data were available to this reviewer regarding the selection process, rate of attrition, age, and

level of dissatisfaction with the tenure system. The evidence of the Commission's study does indicate, however, that the institution's past "opportunities" have not resulted in satisfied young faculty.

The second line of argument regarding tenure reward includes the following components: tenure leads to poor undergraduate teaching, tenured professors concentrate on research, tenure is awarded to faculty members who publish regularly, research is more easily measured than good teaching. The conclusion offered is that the reward of tenure "fails to serve institutional and social needs."

Four studies have been cited which discuss the frequency of tenure award among candidates considered (Dressel (1963); Van Alstyne (1971); Keast and Macy (1973); El-Khawas and Furniss (1974)). One researcher (Dressel, 1963) was told no such data existed. The University of Utah (Van Alstyne, 1971) disclosed that during the five-year span 1965-1970, 278 of 310 faculty members were awarded tenure. The Commission on Academic Tenure (1973) asked 126 public institutions for the percentage of faculty members considered for tenure in spring 1971 that actually received tenure, and over 30 percent of the institutions did not respond. Of the remaining 70 percent, the most frequent response was that between 80 and 100 percent of those considered for tenure were so awarded. El-Khawas and Furniss (1974) stated that a trend was apparent

to award tenure less frequently in 1974 than in 1972, using data from 511 institutions with a response rate of 93 percent. It seems reasonable, therefore, to state that the longitudinal data available in this review indicate that there was a swell in frequency of tenure award in the early 1970s, but the current trend is in the opposite direction.

Undergraduate teaching and good teaching are the subjects of several researches included here. Aleamoni and Yimer (1973) found a small ($r = .27$), but significant, correlation between good teaching and academic rank. Wilson et al. (1973), found no difference among faculty ranks with regard to concern for teaching or relations with students. Riley (1959) found that younger professors (without reference to rank or tenure status) were considered better teachers by student evaluations. McKeachie (1973) found no relationship between student evaluations of teaching and faculty knowledge, experience, sex, or rank. James (1975) found that nontenured professors were considered better teachers by students at one university. Thus no relationship was found between rank and teaching effectiveness in three studies; the 1959 study indicated youthfulness and good teaching were correlated, and one study found that nontenured faculty were considered better teachers. Good teaching has been assessed from the student, colleague, and administrator points of view. The evidence indicates that teaching is

being measured rigorously, and poor correlations were found between good teaching and tenure status as measured across ranks in three of five studies reviewed.

The relationship between research and tenure award has been reviewed also. Luthans (1967) found heavy emphasis on research by central and decentral administrators. Aleamoni and Yimer (1973) found no relationship between number of publications and teaching effectiveness. Wilson et al. (1973) found full professors scored significantly higher than associate or assistant professors on a "research activity" factor. Usher (1966) quoted the factor of research as one of six used in tenure award decisions. The evidence regarding the relationship between research and tenure award is unclear.

In this context, it is interesting to note that the Commission on Academic Tenure (1973) found 78 percent of faculty members questioned believing that teaching effectiveness should be the primary criterion for promotion and 44 percent believing that tenure status requires publications. Yet only one study indicated that the research level of full professors differed significantly from that of associate and assistant professors, and then without discriminating tenure status. There was no statistical evidence that publishing leads to tenure award.

Finally, the statement that tenure award "fails to meet institutional needs" has no basis in the research reviewed; several

studies have been cited which indicate that tenure furthered institutional goals and purposes.

The third argument, that the tenure system pressures the young faculty unduly, is a value judgment not directly quantifiable. It can only be said that the majority of studies reviewed here do not control for age of the faculty member. Two significant studies incorporated age into their research design. The first, a 1959 study by Riley, showed that youthfulness was a significantly positive factor in student assessments of teaching effectiveness when combined with a graduate degree. The second study was mentioned during discussion of the first argument: the Commission on Academic Tenure (1973) assessed the attitudes of tenured and nontenured professors, concluding that "...differences apparently associated with area or type of institution are often as important as those associated with tenure" (1973, p. 237).

The attitudes of faculty aged 35 and under indicated a higher percentage of agreement than older faculty on the following items:

(1) the administration of my department is autocratic;

(2) junior faculty members have too little to say in departmental government;

(3) a small group of senior professors has disproportionate power in decision-making in this institution. (1973, p. 237)

The older faculty agreed with younger faculty regarding:

(1) teaching effectiveness, not publications, should be the primary criterion for promotion of faculty;

(2) faculty promotions should be based in part on formal student evaluations of their teachers; and

(3) in my department it is very difficult for a man to achieve tenure if he does not publish. (1973, p. 240-247)

Since the percent agreement with these three statements across all age groups was above 60 percent, there was apparently a consensus that the existing tenure system was not reflecting the priorities of the faculty. The combination of six items did not, however, indicate a unique attitude among younger faculty regarding undue pressure to demonstrate qualifications.

The major problem inherent in the presently reviewed literature is limited applicability. Samples used in studies relating tenure status to psychosocial characteristics are intended to represent the population of faculty affected by tenure award decisions. This population should be defined so as to avoid the frustrating circumstance of having a set of data with applicability, although it is not known to whom.

The data-generating samples reviewed averaged about 60 percent of the "invited" sample. The "invited" samples were not randomized. Randomization is a technique to achieve representativeness indirectly. The studies thus reported statistical manipulations of data obtained from nonrandomized "data generating" samples with response rates averaging 60 percent of the "invited" samples.

Another problem which arises in most behavioral research revolves around the difference between "statistical" significance and "practical" significance. As is well known, a large sample size facilitates a finding of statistical significance--due as much to the fact that the sample size is used in the statistical test as due to any real difference which might exist. The commonly used technique of squaring the correlation coefficient, in order to derive an estimate of the proportion of variance explained, frequently causes the investigator chagrin due to the small coefficient of determination. The issue of "practical" significance becomes a decision as to degree of acceptance; i.e., subsequent to statistical manipulations, the investigator adjusts the degree to which he or she accepts the hypothesis being tested.

Sample size, randomization and significance, therefore, are the problems which social scientists must acknowledge with regularity. These problems exist in the research reviewed in this chapter.

This review has summarized selected empirical studies regarding the tenure-granting process and its precursors. Inadequate sampling methods limit the generalizability of these studies to the universe of tenured and nontenured faculty members. They have, however, represented the state of the discussion regarding tenure award in colleges and universities today.

CHAPTER THREE
METHODOLOGY

Statistical Techniques

Three multivariate statistical techniques are used in the present study: discriminant function analysis, multiple regression analysis, and Rao's T_2. Discriminant functions are derived for each year's data (1972-1976) from two sets of variables. The first discriminant function is developed to separate two groups--representative of tenured and nontenured faculty--using only the "experience" variables. The second discriminant function is developed so as to separate these same two groups, but using the "experience" (or longevity) and the "merit" (or productivity) variables.

The first question to be examined is one regarding the statistical distinction which could be made between tenured and tenure-accruing faculty, on the basis of the "experience" (or longevity) variables alone (i.e., years in tenure track and academic rank). One intuitively appealing method of differentiation between the two groups on these two variables would be to examine the group means on each of these variables. However, this method would present a distorted view if the correlation between the two variables of interest is high. As the correlations among the variables become larger, the probability of distortion of "true" group differences on the construct of "experience" tends to increase.

The Statistical Package for the Social Sciences (SPSS) subprogram for discriminant analysis was used in this study. The method of discriminating between groups is determined by the SPSS user. For this analysis, all independent variables were entered in the analysis simultaneously. Due to the difference in size between the two groups in any year analyzed, the Bayesian adjustment for prior probabilities was also employed. This a priori classification probability is used in conjunction with the actual pattern to classify individuals into either of the two groups. This technique relates to "base rate." Specifically, if it can be assumed that the two groups differ substantially in size (in the population), the optimal discriminant function must include a correction for this difference. Otherwise, for any realistic value of the discriminant function, there is a greater probability that a randomly selected individual will be misclassified into the group with the greater number of cases. According to Overall and Klett:

> The total probability of error obtained by taking base rates into consideration...is substantially smaller than that resulting from using a cutting point placed halfway between the two group means....Whether or not the Bayesian solution which minimizes total number of errors at the expense of misclassifying a higher proportion from the smaller population is chosen will depend on the objectives and values involved. A cutting point can be chosen to accomplish either objective. (1972, p. 263)

For any particular year, the probability of not receiving tenure is greater than that of being awarded tenure. This is particularly true

in this study, due to the fact that it focuses on faculty who, for whatever reasons, have been classified by administrators as having experience which is equivalent, in chronological terms, to having begun in 1970 or later. These faculty are considered "most recent entrants" into the tenure-accruing cycle, as defined by the administrators who classified their previous experience.

This fact, accompanied by the desire to minimize overall error in the analysis, led to the decision to include the correction for prior probability of group membership. Since it was known that all faculty members fitting the selection criteria were entered into the discriminant analysis (i.e., one university's population of "most recent entrants"), the proportion of cases falling into each group each year was taken as the group's prior probability.

The procedure followed in this study was first to identify the groups for analysis in each year--tenured and nontenured. Second, the variables used for discrimination between the groups were introduced. Careful examination of the raw data led to two corrections for the tenured group. First, many of the tenured faculty were awarded promotions in rank at the same time as they were awarded tenure. The personnel file for those persons would therefore reflect a higher rank in the same year as the tenure award. Since the primary question of this investigation was whether or not differences existed after experience variables were controlled, spurious results would be obtained if the change in rank was not reversed.

Therefore, each change in rank which occurred in the same year as tenure award was reversed. Second, it was learned that tenure status was awarded during the spring of each academic year, but not reflected on the academic personnel file until the following year's file was created. Proper comparisons would only be possible if the data from the previous year were used for each tenured faculty member in the current year. This second correction was also done manually. One equation was generated for each year which maximized the distance between the two groups, based upon all variables entered.

This same procedure is used twice. First, a discriminant function is generated which includes only the experience-related variables. The second discriminant function includes not only the previously-mentioned variables, but also includes number of books published, number of national journal articles published, number of local journal articles published, number of exhibits, number of awards and honors, number of professional fraternity memberships, number of professional registrations, and number of civic organization memberships. The intercorrelations of these variables for each of the years analyzed are presented in the next chapter. It should be mentioned again that for the years 1972 through 1976, these functions were generated from data gathered from personnel files on faculty members fitting the following selection criteria:

(1) each began employment with the university as of 1970 or later, and

(2) each was in tenure-accruing status (had a "tenure-accruing date") of 1970 or later, and

(3) each was either tenured or was accruing time toward a tenure decision in his or her current position during the years 1970 to 1976.

Rao's T_2

Given the intermediate results from these two discriminant functions, further analysis was performed using Rao's T_2 in order to test the significance of the contribution of the eleven variables when compared to the discriminating power of the two variables in the other function.

Rao's T_2 is applied to certain values generated by the discriminant analyses so as to examine the statistical significance of any change in correct classification associated with the added variables. Based on the literature review of the previous chapter and the published regulations, it seems reasonable to assume that, given information regarding academic rank, years in tenure track, and the "merit" variables, a reasonably accurate discriminant function will be obtained, separating tenured and nontenured faculty members. Many studies have shown that there is a strong correlation between one or more of the "experience" variables and the second group of variables. Is there sufficient improvement in the accuracy of the discriminant function generated by both types of variables to indicate

that productivity measures reduce the error of classification significantly? Rao's T_2 addresses this question.

By controlling for the discriminatory power of the "experience" variables, Rao's T_2 tests the additional discrimination possible due to the second group of variables, disregarding the correlations among the variables by partialling out, or controlling, them.

Multiple Regression

To test the hypothesis concerning sex of the faculty member, the regression subroutine available from the Statistical Package for the Social Sciences was used. With tenure status as the dependent variable, all independent variables were used as predictors. Since the only variable of interest at this stage of the analysis is sex of the faculty member, its coefficient and F-ratio are the only statistics examined from these equations.

A second set of regression equations was generated, this time using each merit measure in each year as the dependent variable. Predictors for this set of equations were academic rank, tenure status, sex, and years in tenure track. The unstandardized coefficients for the dichotomous variables indicate the mean differences between the two groups on each merit measure.

Student's t Statistic

If Rao's T_2 indicates that a significant difference is obtained by adding the merit variables, the question to be answered next is

which of the merit variables contribute to this separation. When applicable, Student's t statistic has been used to address this question. That is, for each combination of academic rank and years in tenure track, the means on each merit variable of the tenured and nontenured groups were tested for significant differences by deriving Student's t. If all combinations were tested, approximately 1,200 group means and variances would be derived, resulting in 600 separate t tests. It would not be legitimate to test for group differences, however, if the group sizes were quite small. The minimum sample size for t tests in this analysis will be 13; i.e., nontenured plus tenured for each combination of rank and years in tenure track must equal at least 13.

Data Collection

A comprehensive analysis of available data regarding evaluation of faculty members considered for tenure is essential to a university's self-evaluation. Personnel files computerized by the Office of Academic Affairs at this university were the sources used in this analysis.

Tenure-acquiring behavior at the university was observed after the fact, or ex post facto, through analysis of the fluctuations across time of multiple variables. For each year analyzed, the faculty member was classified as either "tenured" or "nontenured, accruing tenure," and the faculty member's personnel file was examined for current values on the variables of interest.

The method used to access the computer tapes maintained by the Office of Academic Affairs was as follows: select cases with "service year" and "tenure accruing date" of 1970 or greater and having a tenure code of 1 (tenured) or 2 (nontenured, accruing time for tenure decision).

The selection method was restricted in this way so as to consider the most recent (1) entrants, and (2) "complete decision-making cycle" possible. By "complete decision-making cycle," reference is made to the rule mentioned earlier: that each faculty member will be employed by this university for five years, experience a review for tenure status at that time, then either be granted tenure or not. The "most recent entrants" term refers to the classification of each case as a faculty member whose tenure-accruing experience begins, either physically or by years of credit, within the term of this selection request. For each faculty member, the variables defined below were examined, and the values held at that time by each faculty member selected were recorded for further analysis.

Variables

Academic Rank

For the purposes of this study, the official designation of a faculty member which reflects tenure-earning status is collected. These ranks include professor, associate professor, and assistant professor. Academic rank data are coded as two nominal variables,

recorded as follows: Assistant Professor = 10, Associate Professor = 01, Professor = 00.

Awards and Honors

This variable counts the number of incidents of professional recognition of a faculty member at the university by special groups such as honor societies, professional societies, etc. It is considered a ratio measurement, since the value of zero on this measure would indicate total absence of the property measured. Although an argument could be raised that some awards and honors are "worth more" than others, this study is not so fine-tuned as to allow this degree of investigation; furthermore, the computerized personnel files maintained by the Office of Academic Affairs does not weight the awards and honors listed therein, but only counts them.

Publications

Three variables are counted under this general classification. Books, national journal articles and local journal articles are each recorded in the personnel file used in this study. These variables were measured in terms of frequency of publication per faculty member per time period, and are considered ratio measures.

Exhibits of Professional Works

To acknowledge the fact that growth and professional stature within some fields is more appropriately reflected by exhibitions than by publications, the personnel files maintained by the Office of

Academic Affairs included this category of excellence. It also is considered a ratio measure, and is measured in terms of frequency per faculty member.

Memberships

One indicator of a faculty member's desire to keep abreast of the developments within his or her area of expertise is the professional and civic activity related to the organizations to which he or she belongs. It is assumed that membership in the organization indicates activity, and that activity within one's profession and one's community is related to the tenure award decision. Two variables fall under this classification: professional fraternities and civic organizations. Both are considered to be ratio measures.

Years Employed at the University

This measures the length of time which a faculty member has been employed at this university. Given the restrictions of the selection request, the possible values on this variable are limited to seven; in light of the specifications apparent from the information quoted in Chapter One of this study, it is unlikely that values greater than five will be found. This variable is also considered to be a ratio measure.

Years of Credit

As noted in Chapter One, many statewide governing boards of higher education have established procedures whereby a new faculty member for certain reasons can be considered for tenure sooner than

the regular time interval. One such circumstance relates to the years of experience which the faculty member has had at another university. This variable acknowledges that possibility, as the personnel files allow computation of same. It is considered to be a ratio measure.

Years in Tenure Track

For reasons detailed in Chapter Four, a combination of credit and current employment was derived and defined as "years in tenure track." This ratio measure was used in lieu of the independent consideration of both "years employed" and "years of credit," due to the restricted values of these two latter measures.

Sex of Faculty Member

To examine the possibility of significant differences between the tenure award decision for male and female faculty members, this variable has been recorded as a nominal measure; i.e., codes of "0" have been recorded for male and "1" for female faculty members.

Professional Registrations

Another type of recognition of faculty members typically mentioned in the tenure award decision is the registers, such as Who's Who in America, in which they are included. This variable is also considered to be a ratio measure, since the data are recorded only in terms of frequency of professional registrations.

Tenure Status

Another nominal measure, tenure status reflects only whether or not a faculty member selected for this study has been awarded tenure (coded as "1") in the particular year examined. A tenure code of "0" thus relates to a faculty member's status as "non-tenured, accruing time toward a tenure decision."

Social Security Number

This variable is the nine digit number, again nominal measurement, assigned to individuals by the Social Security Administration. It is used in this study only to distinguish cases.

CHAPTER FOUR
RESULTS OF THE DATA ANALYSES

To understand the significance of the statistical results quoted in this chapter, further description of the two groups is helpful. Additional information concerning the two populations in each year will affect the significance of "X really being related to Y."

Group Sizes and Prior Probabilities

It was mentioned in Chapter Three that the substantial difference between the sizes of the two groups led to the conclusion that a Bayesian adjustment for prior probabilities was necessary. These two groups, for whatever reasons, are considered to be the "most recent entrants" into the tenure-granting cycle by the administrators making the decision to employ them. The cases in this analysis were selected in such a way as to limit the examination to faculty who, for whatever reasons, were classified by university administrators as only having applicable experience (credit or service at the university) which began in 1970 or later.

It follows then that the total years in tenure track for faculty members selected in 1972 will be either one, two, or three years, and that these years may be either a combination of credit plus experience at this university, all credit, or all experience. This

study therefore tracks the five-year tenure experience of faculty with seven or less years of tenure track experience.

The intention of this selection was to limit examination to those faculty judged by university management to have very current university experience, whether at the present university or elsewhere. One logical effect of this limitation is varying probabilities of obtaining tenure, increasing as the years in tenure track progress. This approach is not sensitive to the varying probabilities of obtaining tenure particular to groups determined by years in tenure track within each calendar year. Unfortunately, group sizes based on this variable vary greatly during the calendar years studied. The Bayesian technique represents the summed probabilities of obtaining tenure for all groups in a particular year.

To restate the selection criteria:

(1) each began employment with the university as of 1970 or later, and

(2) each was in tenure-accruing status as of 1970 or later, and

(3) each was either tenured or was accruing time toward a tenure decision in his/her current position during the years 1970 to 1976.

The following table presents the actual numbers of faculty in each group in each year analyzed, and the prior probability generated on that basis.

TABLE 4-1
1972 TO 1976 TENURED AND NONTENURED FACULTY
GROUP SIZES AND PRIOR PROBABILITIES

YEAR	TENURED		NONTENURED	
	N_t	P_t	N_{nt}	P_{nt}
1972	18	.04	404	.96
1973	17	.03	561	.97
1974	36	.05	715	.95
1975	95	.13	661	.87
1976	98	.15	538	.85

Several facts are apparent in this first table. First, the number of faculty members attaining tenure each year increased from 1972 to 1976. None of the faculty members attaining tenure in an early year are counted in subsequent years of the tenured group. Does this mean that the university has exhibited a decision-making process contrary to that which might be indicated by the oft-quoted economic reality of steady-state enrollment? Not necessarily; the very selection method of this study has decreased the likelihood of large tenured populations in the early years. It seems more compelling to reason that the small numbers of tenured faculty indicate the degree to which the typical tenure guidelines (quoted in Chapter One) are being followed. Due to the fact that faculty members in this study had tenure-accruing dates as of 1970 or later, those

attaining tenure in 1972 had at most three years of tenure track experience. The fact that the probability of being granted tenure during these five years only increased from 4 to 15 percent indicates the limited likelihood of receiving tenure at this research institution with seven or less years of qualifying experience.

Another fact revealed in the first table of this chapter is that the size of the nontenured group fluctuated throughout the five years analyzed. The proportion of nontenured faculty in each year of the analysis has either declined (prior probability column for nontenured faculty, 1975-76) or remained steady (1972-1974). One plausible interpretation of this fact is that those faculty with more experience attained tenure status in the later years of this study, and no significant number of tenure track positions were subsequently released to departments. Contributing to the validity of this interpretation is the fact that the number of faculty obtaining tenure in each of those two years is also higher than the number of tenured faculty in previous years.

A distribution of male and female faculty classified according to rank, years in tenure track, and tenure status is presented next for each year's data.

TABLE 4-2
EXPERIENCE DATA AND SEX OF 1972 TENURED AND NONTENURED FACULTY

GROUP	SEX	RANK	YEARS IN TENURE TRACK 1	2	3
Tenured					
	Male	Asst. Prof.	0	0	0
		Assoc. Prof.	0	0	1
		Professor	0	14	3
	Female	Asst. Prof.	0	0	0
		Assoc. Prof.	0	0	0
		Professor	0	0	0
Nontenured					
	Male	Asst. Prof.	75	100	101
		Assoc. Prof.	17	13	24
		Professor	11	19	3
	Female	Asst. Prof.	5	8	17
		Assoc. Prof.	4	2	0
		Professor	1	0	1

TABLE 4-3
EXPERIENCE DATA AND SEX OF 1973 TENURED AND NONTENURED FACULTY

GROUP	SEX	RANK	YEARS IN TENURE TRACK 1	2	3	4
Tenured						
	Male	Asst. Prof.	0	0	0	0
		Assoc. Prof.	0	1	0	6
		Professor	0	2	6	1
	Female	Asst. Prof.	0	0	0	0
		Assoc. Prof.	0	0	0	0
		Professor	0	1	0	0
Nontenured						
	Male	Asst. Prof.	82	93	102	107
		Assoc. Prof.	16	21	14	20
		Professor	13	11	14	2
	Female	Asst. Prof.	21	8	8	18
		Assoc. Prof.	3	5	2	0
		Professor	0	0	0	1

TABLE 4-4
EXPERIENCE DATA AND SEX OF 1974 TENURED AND NONTENURED FACULTY

GROUP	SEX	RANK	YEARS IN TENURE TRACK 1	2	3	4	5
Tenured							
	Male	Asst. Prof.	0	0	0	0	0
		Assoc. Prof.	0	0	1	5	8
		Professor	0	3	8	7	1
	Female	Asst. Prof.	0	0	0	0	0
		Assoc. Prof.	0	0	0	0	3
		Professor	0	0	0	0	0
Nontenured							
	Male	Asst. Prof.	91	97	104	98	92
		Assoc. Prof.	21	19	22	13	23
		Professor	13	12	4	9	1
	Female	Asst. Prof.	20	24	10	8	13
		Assoc. Prof.	4	3	4	2	2
		Professor	2	2	1	0	1

TABLE 4-5
EXPERIENCE DATA AND SEX OF 1975 TENURED AND NONTENURED FACULTY

GROUP	SEX	RANK	YEARS IN TENURE TRACK 1	2	3	4	5	6
Tenured								
	Male	Asst. Prof.	0	0	0	0	0	0
		Assoc. Prof.	0	0	1	12	7	50
		Professor	1	8	2	2	3	2
	Female	Asst. Prof.	0	0	0	0	0	0
		Assoc. Prof.	0	0	0	1	0	3
		Professor	0	1	1	1	0	0
Nontenured								
	Male	Asst. Prof.	3	116	103	92	90	49
		Assoc. Prof.	0	25	20	18	11	5
		Professor	0	7	7	2	8	1
	Female	Asst. Prof.	3	29	27	10	7	9
		Assoc. Prof.	1	5	3	2	3	1
		Professor	0	3	0	0	0	1

TABLE 4-6
EXPERIENCE DATA AND SEX OF 1976 TENURED AND NONTENURED FACULTY

GROUP	SEX	RANK	YEARS IN TENURE TRACK 1	2	3	4	5	6	7
Tenured									
	Male	Asst. Prof.	0	0	0	0	0	0	0
		Assoc. Prof.	0	1	1	10	8	48	8
		Professor	2	0	5	1	0	3	0
	Female	Asst. Prof.	0	0	0	0	0	0	0
		Assoc. Prof.	0	0	0	2	2	5	0
		Professor	0	0	1	0	0	0	1
Nontenured									
	Male	Asst. Prof.	1	3	106	95	85	48	38
		Assoc. Prof.	0	0	23	16	16	5	4
		Professor	0	0	1	6	1	4	1
	Female	Asst. Prof.	0	2	27	25	9	3	7
		Assoc. Prof.	0	1	2	4	1	1	1
		Professor	0	0	2	0	0	0	0

Tables 4-2 through 4-6 reflect the raw data from each year's data file. Since tenure status is evaluated in the Spring of each academic year, altered tenure status is first shown in the data file on the following year. Therefore, prior year data form the bases on which tenure award decisions are made. This means that the faculty member's merit measures, rank, and years in tenure track from the previous year must be used to examine the tenure questions raised in this dissertation.

Tables 4-7 through 4-11 recreate the distribution of rank, years in tenure track, and sex of faculty members in accordance with this additional information. The number of years in tenure track reflects completed years as opposed to current years. For example, in 1972, fourteen male professors were awarded tenure upon completion of one year in tenure track. Their ranks when considered for tenure (in 1971) were all at full professor level. There were eighteen full professors not tenured in 1972 who form the comparison group for the fourteen. Merit data for each group should originate from the file dated 1971. This file was available and was accessed.

It follows that zero completed years in tenure track signify initial employment information. Theoretically, a faculty member could be hired in 1972 into a tenured post, without any on-campus history available from earlier years' personnel files. This occurred in two years: 1975 and 1976, to three faculty members. The much more likely occurrence was to be hired into a tenure track post as a nontenured candidate, as Tables 4-7 through 4-11 indicate. These tables indicate the group sizes after correction for rank and experience on which evaluation for tenure would have been based.

TABLE 4-7
1972 TENURED AND NONTENURED COHORTS CORRECTED FOR RANK AND EXPERIENCE ON WHICH EVALUATION FOR TENURE WOULD HAVE BEEN BASED

GROUP	SEX	RANK	COMPLETED YEARS IN TENURE TRACK 0	1	2
Tenured					
	Male	Asst. Prof.	0	0	1
		Assoc. Prof.	0	0	0
		Professor	0	14	3
	Female	Asst. Prof.	0	0	0
		Assoc. Prof.	0	0	0
		Professor	0	0	0
Nontenured					
	Male	Asst. Prof.	76	102	101
		Assoc. Prof.	17	12	24
		Professor	10	18	3
	Female	Asst. Prof.	5	8	17
		Assoc. Prof.	4	2	0
		Professor	1	0	1

1973 TENURED AND NONTENURED COHORTS CORRECTED FOR RANK AND EXPERIENCE ON WHICH EVALUATION FOR TENURE WOULD HAVE BEEN BASED

GROUP	SEX	RANK	COMPLETED YEARS IN TENURE TRACK 0	1	2	3
Tenured						
	Male	Asst. Prof.	0	1	0	1
		Assoc. Prof.	0	0	1	5
		Professor	0	2	5	1
	Female	Asst. Prof.	0	0	0	0
		Assoc. Prof.	0	0	0	0
		Professor	0	1	0	0
Nontenured						
	Male	Asst. Prof.	82	93	102	107
		Assoc. Prof.	16	21	14	20
		Professor	13	11	14	2
	Female	Asst. Prof.	21	8	8	18
		Assoc. Prof.	3	5	2	0
		Professor	0	0	0	1

TABLE 4-9
1974 TENURED AND NONTENURED COHORTS CORRECTED FOR RANK AND EXPERIENCE ON WHICH EVALUATION FOR TENURE WOULD HAVE BEEN BASED

GROUP	SEX	RANK	COMPLETED YEARS IN TENURE TRACK 0	1	2	3	4
Tenured							
	Male	Asst. Prof.	0	0	0	2	5
		Assoc. Prof.	0	0	1	5	3
		Professor	0	3	8	5	1
	Female	Asst. Prof.	0	0	0	0	3
		Assoc. Prof.	0	0	0	0	0
		Professor	0	0	0	0	0
Nontenured							
	Male	Asst. Prof.	92	98	104	99	98
		Assoc. Prof.	20	18	22	13	17
		Professor	13	12	4	8	1
	Female	Asst. Prof.	21	24	10	9	13
		Assoc. Prof.	3	3	4	1	2
		Professor	2	2	1	0	1

TABLE 4-10
1975 TENURED AND NONTENURED COHORTS CORRECTED FOR RANK AND EXPERIENCE ON WHICH EVALUATION FOR TENURE WOULD HAVE BEEN BASED

GROUP	SEX	RANK	COMPLETED YEARS IN TENURE TRACK 0	1	2	3	4	5
Tenured								
	Male	Asst. Prof.	0	0	1	4	6	38
		Assoc. Prof.	0	0	0	8	2	14
		Professor	1	8	2	2	2	0
	Female	Asst. Prof.	0	0	0	0	0	3
		Assoc. Prof.	0	0	0	1	0	0
		Professor	0	1	1	1	0	0
Nontenured								
	Male	Asst. Prof.	3	118	104	92	90	49
		Assoc. Prof.	0	24	19	18	13	5
		Professor	0	6	7	2	6	1
	Female	Asst. Prof.	3	29	27	10	7	9
		Assoc. Prof.	1	5	3	2	3	1
		Professor	0	3	0	0	0	1

TABLE 4-11
1976 TENURED AND NONTENURED COHORTS CORRECTED FOR RANK AND EXPERIENCE ON WHICH EVALUATION FOR TENURE WOULD HAVE BEEN BASED

GROUP	SEX	RANK	COMPLETED YEARS IN TENURE TRACK 0	1	2	3	4	5	6
Tenured									
	Male	Asst. Prof.	0	0	1	5	5	40	8
		Assoc. Prof.	0	1	1	5	3	8	0
		Professor	2	0	4	1	0	3	0
	Female	Asst. Prof.	0	0	0	2	1	4	0
		Assoc. Prof.	0	0	0	0	1	1	0
		Professor	0	0	1	0	0	0	1
Nontenured									
	Male	Asst. Prof.	1	3	107	96	85	48	43
		Assoc. Prof.	0	0	22	15	16	7	0
		Professor	0	0	1	6	1	2	0
	Female	Asst. Prof.	0	2	27	25	9	3	8
		Assoc. Prof.	0	0	3	4	1	1	0
		Professor	0	0	1	0	0	0	0

The Discriminant Functions

As discussed in Chapter Three, the general form of the discriminant function linear combination is:

$$D_i = d_{i1}Z_1 + d_{i2}Z_2 + \ldots + d_{ip}Z_p,$$

where D_i represents the score obtained by adding the weighted (d_{ip}) standardized values (Z_p) of the P discriminating variables used in the analysis.

The standardized discriminant functions are presented below for each year studied. The variables X_1 through X_{11} are:

X_1 -- rank 1 (Assistant Professor = 1)

X_2 -- rank 2 (Associate Professor = 1)

X_3 -- years in tenure track

X_4 -- number of books published

X_5 -- national journal articles published

X_6 -- number of exhibits

X_7 -- local journal articles published

X_8 -- awards and honors received

X_9 -- professional fraternity memberships

X_{10}-- civic organization memberships

X_{11}-- professional registrations

For the year 1972, the two standardized discriminant functions are of the form:

$$D_{p+q} = (1.050)X_1 + (1.027)X_2 + (-.126)X_3 + (-.218)X_4 + (.354)X_5 + (.012)X_6 + (-.129)X_7 + (.124)X_9 + (-.008)X_{10} + (-.032)X_{11}$$

$$D_p = (-1.034)X_1 + (-1.028)X_2 + (.139)X_3$$

The variable X_8, awards and honors, has been dropped from the first discriminant function for 1972 because its mean and standard deviation were zero (i.e., there were no entries for this variable), which caused singularity of the within groups covariance matrix.

The standardized discriminant functions for 1973 were:

$$D_{p+q} = (-.835)X_1 + (-.428)X_2 + (.234)X_3 + (.231)X_4 + (.526)X_5 + (.003)X_6 + (-.353)X_7 + (-.149)X_8 + (.064)X_9 + (-.130)X_{10} + (-.161)X_{11}$$

$$D_p = (-1.075)X_1 + (-.723)X_2 + (.361)X_3$$

For the data gathered for the year 1974, the discriminant functions are:

$$D_{p+q} = (1.030)X_1 + (.921)X_2 + (-.421)X_3 + (-.287)X_4 + (-.041)X_5 + (.032)X_6 + (.180)X_7 + (.076)X_8 + (-.032)X_9 + (-.106)X_{10} + (-.043)X_{11}$$

$$D_p = (-1.014)X_1 + (-.949)X_2 + (.464)X_3$$

The 1975 data generated the following functions:

$$D_{p+q} = (.665)X_1 + (.319)X_2 + (-.718)X_3 + (-.077)X_4 + (-.190)X_5 + (.026)X_6 + (-.148)X_7 + (.038)X_8 + (-.105)X_9 + (-.079)X_{10} + (.048)X_{11}$$

$$D_p = (-.949)X_1 + (-.484)X_2 + (.828)X_3$$

The final year analyzed in this study was 1976. The standardized discriminant functions for that year are:

$$D_{p+q} = (-.822)X_1 + (-.538)X_2 + (.662)X_3 + (.169)X_4 + (.098)X_5 + (.316)X_6 + (-.058)X_7 + (.018)X_8 + (.341)X_9 + (-.085)X_{10} + (-.182)X_{11}$$

$$D_p = (-1.056)X_1 + (-.658)X_2 + (.817)X_3$$

Deriving Rao's T_2

Given the eigenvalues and group sizes quoted earlier in this chapter, the derivation of Rao's T_2 becomes a straightforward process. The test statistic is:

$$T_2 = \frac{N - P - Q - 1}{P} \quad \frac{c(D^2_{p+q} - D^2_q)}{N - 2 + cD^2_q},$$

which results in the T_2 observed in Table 4-12.

TABLE 4-12
RAO'S T_2 FOR THE YEARS 1972 TO 1976

YEAR	$T_{2\,observed}$	$T_{2\,critical}$ (.05, .01)
1972	9.0997**	(2.60, 3.78)
1973	11.7429**	(2.60, 3.78)
1974	5.1001**	(2.60, 3.78)
1975	4.5694**	(2.60, 3.78)
1976	6.0082**	(2.60, 3.78)

A conclusion apparent from the preceding table is that for all years analyzed, information regarding "merit" variables increases the discriminating ability of an equation to separate tenured from non-tenured faculty, beyond the discrimination possible based on "experience" variables alone. The practical significance of this conclusion will be discussed in the final chapter.

Correlations Among Variables

Before examining the group differences on the individual variables contributing to the findings of significance cited above, it is essential to know the size of the intercorrelations among the variables used in this study. The next tables present the within groups correlation matrix for each year.

TABLE 4-13
1972 WITHIN GROUPS CORRELATION MATRIX

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1.00										
X_2	-.74**	1.00									
X_3	.10	-.03	1.00								
X_4	-.19*	.11	.07	1.00							
X_5	-.38**	.11	.02	.15	1.00						
X_6	-.01	.03	.02	.07	.03	1.00					
X_7	-.34**	.12	.08	.19	.53**	.08	1.00				
X_8	na	na	na	na	na	na	na	na			
X_9	-.26**	.10	.07	.10	.25*	.05	.31**	na	1.00		
X_{10}	-.14	.10	.00	-.02	.03	.06	.09	na	.22*	1.00	
X_{11}	-.11	.11	-.02	.07	.12	-.02	.06	na	.14	.13	1.00

Variables List

X_1 -- Assistant Professor

X_2 -- Associate Professor

X_3 -- years in tenure track

X_4 -- books

X_5 -- national journal articles

X_6 -- exhibits

X_7 -- local journal articles

X_8 -- awards and honors

X_9 -- professional fraternities

X_{10}-- civic organizations

X_{11}-- professional registrations

*r_{crit} = ±.195 for .05 significance level

**r_{crit} = ±.254 for .01 significance level

TABLE 4-14
1973 WITHIN GROUPS CORRELATION MATRIX

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1.00										
X_2	-.75**	1.00									
X_3	.09	-.02	1.00								
X_4	-.28**	.16	.02	1.00							
X_5	-.35**	.09	.03	.21*	1.00						
X_6	.01	-.00	.02	-.00	.01	1.00					
X_7	-.25*	.06	.08	.14	.40**	.06	1.00				
X_8	-.05	-.01	-.15	.05	.12	-.00	.08	1.00			
X_9	-.20*	.13	.12	.07	.18	-.03	.22*	.15	1.00		
X_{10}	-.14	.11	-.05	.02	.02	-.00	.08	.07	.14	1.00	
X_{11}	-.16	.14	.01	.14	.17	-.01	.06	-.00	.17	.02	1.00

Variables List

X_1 -- Assistant Professor

X_2 -- Associate Professor

X_3 -- years in tenure track

X_4 -- books

X_5 -- national journal articles

X_6 -- exhibits

X_7 -- local journal articles

X_8 -- awards and honors

X_9 -- professional fraternities

X_{10} -- civic organizations

X_{11} -- professional registrations

$*r_{crit} = \pm .195$ for .05 significance level

$**r_{crit} = \pm .254$ for .01 significance level

TABLE 4-15
1974 WITHIN GROUPS CORRELATION MATRIX

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1.00										
X_2	-.78**	1.00									
X_3	.07	.01	1.00								
X_4	-.21*	.13	-.02	1.00							
X_5	-.32**	.13	.09	.22*	1.00						
X_6	.01	-.01	.04	-.01	-.00	1.00					
X_7	-.21*	.02	.05	.15	.33**	.03	1.00				
X_8	-.07	-.01	-.14	.08	.09	-.01	.15	1.00			
X_9	-.16	.12	.18	.04	.17	-.05	.17	.12	1.00		
X_{10}	-.08	.07	.03	-.02	.00	-.00	.03	.07	.15	1.00	
X_{11}	-.13	.12	-.02	.11	.17	-.01	.06	.03	.13	-.00	1.00

Variables List

X_1 -- Assistant Professor

X_2 -- Associate Professor

X_3 -- years in tenure track

X_4 -- books

X_5 -- national journal articles

X_6 -- exhibits

X_7 -- local journal articles

X_8 -- awards and honors

X_9 -- professional fraternities

X_{10}-- civic organizations

X_{11}-- professional registrations

*$r_{crit} = \pm .195$ for .05 significance level

**$r_{crit} = \pm .254$ for .01 significance level

TABLE 4-16
1975 WITHIN GROUPS CORRELATION MATRIX

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1.00										
X_2	-.81**	1.00									
X_3	.13	-.04	1.00								
X_4	-.16	.16	.00	1.00							
X_5	-.28**	.10	.02	.13	1.00						
X_6	-.03	.05	.05	-.01	.00	1.00					
X_7	-.16	.01	.07	.08	.39**	.09	1.00				
X_8	-.04	.04	-.04	-.01	.04	.00	.06	1.00			
X_9	-.14	.07	.03	.05	.22*	-.04	.22*	.01	1.00		
X_{10}	-.06	.05	.03	-.02	-.01	.00	.07	.02	.16	1.00	
X_{11}	-.16	.13	-.05	.10	.17	.00	.05	.02	.18	.03	1.00

Variables List

X_1 -- Assistant Professor

X_2 -- Associate Professor

X_3 -- years in tenure track

X_4 -- books

X_5 -- national journal articles

X_6 -- exhibits

X_7 -- local journal articles

X_8 -- awards and honors

X_9 -- professional fraternities

X_{10} -- civic organizations

X_{11} -- professional registrations

*$r_{crit} = \pm .195$ for .05 significance level

**$r_{crit} = \pm .254$ for .01 significance level

TABLE 4-17
1976 WITHIN GROUPS CORRELATION MATRIX

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}
X_1	1.00										
X_2	-.84**	1.00									
X_3	.10	-.07	1.00								
X_4	-.14	.16	-.01	1.00							
X_5	-.28**	.10	.02	.14	1.00						
X_6	-.02	.04	.03	-.02	-.02	1.00					
X_7	-.18	.02	.07	.08	.42**	.03	1.00				
X_8	.00	-.01	-.07	.00	.01	.01	.05	1.00			
X_9	-.12	.08	.02	.03	.22*	-.07	.19	-.02	1.00		
X_{10}	-.05	.06	.04	-.01	-.02	-.01	.09	-.01	.15	1.00	
X_{11}	-.19	.19	-.03	.04	.22*	-.00	.03	.03	.19	.04	1.00

Variables List

X_1 -- Assistant Professor

X_2 -- Associate Professor

X_3 -- years in tenure track

X_4 -- books

X_5 -- national journal articles

X_6 -- exhibits

X_7 -- local journal articles

X_8 -- awards and honors

X_9 -- professional fraternities

X_{10} -- civic organizations

X_{11} -- professional registrations

*$r_{crit} = \pm .195$ for .05 significance level

**$r_{crit} = \pm .254$ for .01 significance level

Multiple Regression

This statistical technique was used in two ways: (1) to determine the degree to which sex of the faculty member influenced tenure status, and (2) to determine the degree to which the "experience" variables influenced each "merit" variable in these data.

Table 4-18 presents the results of the first regression technique. With tenure status as the dependent variable, all independent variables were used as predictors. The standardized coefficient and F-ratio for the variable, sex, are the only statistics quoted from this first analysis.

TABLE 4-18
REGRESSION OF SEX ON TENURE AWARD

YEAR	COEFFICIENT	$F_{observed}$	$F_{critical}$
1972	.0273	.753	3.84
1973	-.0101	.068	3.84
1974	-.0126	.132	3.84
1975	.0205	.438	3.84
1976	.0105	.098	3.84

Using each "merit" measure as a dependent variable, multiple regression equations were next generated for each year with the following independent variables:

X_1 -- Assistant Professor (otherwise = 0)

X_2 -- Associate Professor (otherwise = 0)

X_3 -- sex (female = 1; male = 0)

X_4 -- tenure status (tenure = 1; nontenured = 0)

X_5 -- years in tenure track

For the dichotomous variables, the unstandardized coefficients represent differences between means for subpopulations that are homogeneous on the other variables. This analysis assumes that the independent variables do not interact. The following tables show the unstandardized regression coefficients generated for each "merit" variable, after the individual faculty entries were corrected for the academic rank and years of experience on which evaluation for tenure would have been based. Finally, the coefficient of determination (R^2) for each merit variable is also listed.

TABLE 4-19
REGRESSION OF SELECTED VARIABLES ON 1972 MERIT MEASURES

Merit Measure	Regression Coefficients					R^2
	X_1	X_2	X_3	X_4	X_5	
books	-.4856	-.1782	-.0815	.5913	.0943	.109
nat'l. journal articles	-11.607	-7.987	-.855	-7.035	.761	.218
local journal articles	-7.107	-4.460	-1.526	-.471	.913	.212
exhibits	.006	.016	-.009	-.002	.003	.002
awards and honors	0.0	0.0	0.0	0.0	0.0	0.0
professional fraternities	-2.378	-1.468	-.282	-1.061	.323	.108
civic organizations	-.176	-.017	.247	-.002	.007	.041
professional registrations	-.081	.100	-.181	-.001	-.004	.022

TABLE 4-20
REGRESSION OF SELECTED VARIABLES ON 1973 MERIT MEASURES

Merit Measure	Regression Coefficients					R^2
	X_1	X_2	X_3	X_4	X_5	
books	-0.722	-0.266	-0.011	0.483	0.038	.117
nat'l. journal articles	-15.776	-11.260	-1.304	8.508	0.652	.263
local journal articles	-8.374	-6.114	-0.446	-3.605	0.728	.113
exhibits	0.197	0.140	-0.124	-0.144	0.058	.001
awards and honors	-0.276	-0.279	0.143	-0.298	-0.124	.032
professional fraternities	-1.236	-0.318	0.077	-0.023	0.256	.067
civic organizations	-0.181	0.019	0.140	-0.246	-0.015	.030
professional registrations	-0.230	0.096	-0.093	-0.150	0.011	.030

TABLE 4-21
REGRESSION OF SELECTED VARIABLES ON 1974 MERIT MEASURES

Merit Measure	Regression Coefficients					R^2
	X_1	X_2	X_3	X_4	X_5	
books	-0.539	-0.182	0.014	0.448	-0.000	.077
nat'l. journal articles	-12.909	-8.366	-1.712	0.754	0.843	.188
local journal articles	-10.595	-8.943	-1.672	-2.431	0.512	.111
exhibits	0.060	-0.056	-0.108	-0.315	0.108	.002
awards and honors	-0.476	-0.446	0.133	-0.145	-0.095	.035
professional fraternities	-0.927	-0.215	0.013	0.103	0.262	.068
civic organizations	-0.096	0.030	0.108	0.108	0.015	.016
professional registrations	-0.156	0.125	-0.085	0.105	-0.010	.023

TABLE 4-22
REGRESSION OF SELECTED VARIABLES ON 1975 MERIT MEASURES

Merit Measure	Regression Coefficients					R^2
	X_1	X_2	X_3	X_4	X_5	
books	-0.152	0.194	0.060	0.120	0.011	.037
nat'l. journal articles	-13.258	-9.308	-2.361	3.194	0.483	.178
local journal articles	-8.583	-7.439	-1.692	2.550	0.605	.122
exhibits	0.084	0.148	-0.022	-0.082	0.090	.246
awards and honors	-0.498	0.829	-0.729	-0.505	-0.335	.003
professional fraternities	-1.163	-0.626	0.122	0.499	0.086	.052
civic organizations	-0.118	-0.021	0.142	0.099	0.023	.018
professional registrations	-0.310	0.048	-0.077	0.004	-0.023	.028

TABLE 4-23
REGRESSION OF SELECTED VARIABLES ON 1976 MERIT MEASURES

Merit Measure	Regression Coefficients					R^2
	X_1	X_2	X_3	X_4	X_5	
books	0.004	0.324	0.066	0.137	0.001	.034
nat'l. journal articles	-15.421	-11.864	-2.093	1.121	0.325	.165
local journal articles	-10.035	-8.839	-1.450	0.360	0.471	.113
exhibits	0.532	0.974	-0.106	1.306	0.083	.019
awards and honors	-0.217	-0.779	-0.603	0.107	-0.655	.005
professional fraternities	-0.827	-0.309	0.107	0.590	0.053	.043
civic organizations	-0.044	0.071	0.113	-0.038	0.026	.011
professional registrations	-0.205	0.297	-0.130	-0.112	-0.015	.043

It is apparent from these unstandardized coefficients that the difference between means based on sex is minor. Rank is much more powerful. For example, the 1972 weights generated by X_1 (signifying assistant professor) equals -11.607 in the equation predicting national journal articles. On a gross level, this indicates that non-assistant professors (i.e., associate and full professors) generate an average of 11.607 more articles than do assistant professors. The coefficient of -0.0815 for sex in that same equation indicates that men generate .0815 more articles, on the average, than do women in corrected 1972 academic ranks. Tenure status generates a coefficient of -7.035, which indicates that tenured faculty on the average produced 7.035 fewer national journal articles than nontenured faculty.

The differences between tenured and nontenured members of the same academic rank and years in tenure status cannot, however, be easily determined by these coefficients. To further examine these data at such a level of detail, Student's t statistics are examined next. Two-group comparisons are based on tenure status within each combination of rank and years in tenure track.

Student's t Statistics

To see in which ranks and for which number of years in tenure status differences exist between tenured and nontenured groups, Student's t statistics are presented next. Although this test is

used for comparison of small groups, only those comparisons based on thirteen or more faculty members per t statistic are tabulated. The potential number of t tests, if all combinations have at least thirteen cases, is 600. For these data, the actual number of t tests computed is 172.

Figure 4-1 first presents a summary of the 23 groups, based on rank and years in tenure track, for which the 172 t statistics could be computed. The tables which follow summarize the results obtained for the tests of significance.

SUMMARY OF 23 TWO-GROUP COMPARISONS OF
TENURED AND NONTENURED FACULTY, 1972 TO 1976

File Date	Completed Years in Tenure Track	Academic Rank of Groups Compared: Assistant Professor	Associate Professor	Full Professor
1972	0	-	-	-
	1	-	-	*
	2	-	-	-
1973	0	-	-	-
	1	-	-	-
	2	-	-	*
	3	-	*	-
1974	0	-	-	-
	1	-	-	*
	2	-	-	*
	3	-	*	*
	4	*	*	-
1975	0	-	-	-
	1	-	-	*
	2	-	-	-
	3	*	*	-
	4	*	*	-
	5	*	*	-
1976	0	-	-	-
	1	-	-	-
	2	-	-	-
	3	*	*	-
	4	*	*	-
	5	*	*	-
	6	*	-	-

Figure 4-1

Legend: * groups of sufficient size (≥13) to permit significance tests.

- no significance tests performed

TABLE 4-24
SELECTED STATISTICS ON MERIT VARIABLES FOR 1972 COHORTS TENURED AS PROFESSORS EVALUATED AT THE END OF ONE YEAR OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=18)	Tenured (N=14)	Nontenured (N=18)	Tenured (N=14)	($t_{crit}=\pm 2.04$)
books	0.556	0.857	1.100	1.657	-0.617
nat'l. journal articles	14.889	5.143	12.804	6.803	2.573*
local joural articles	11.278	6.929	12.902	7.849	1.109
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.000	0.000	0.000	0.000	n.d.
professional fraternities	5.611	3.429	3.395	2.593	1.992
civic organizations	0.389	0.214	0.745	0.426	0.783
professional registrations	0.056	0.143	0.224	0.535	-0.625

n.d. -- no difference

*probability = p≤.05 of chance occurrence

TABLE 4-25
SELECTED STATISTICS ON MERIT VARIABLES FOR 1973 COHORTS TENURED AS PROFESSORS EVALUATED AT THE END OF TWO YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.11$)
	Nontenured (N=14)	Tenured (N=5)	Nontenured (N=14)	Tenured (N=5)	
books	0.500	1.000	1.092	1.414	-0.816
nat'l. journal articles	15.214	22.400	13.543	16.380	-0.967
local journal articles	7.929	4.200	6.615	1.304	1.230
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.500	0.200	1.605	0.447	0.405
professional fraternities	4.143	5.200	2.214	1.789	-0.956
civic organizations	0.286	0.400	0.611	0.894	-0.318
professional registrations	0.286	0.200	0.825	0.447	0.219

n.d. -- no difference

TABLE 4-26

SELECTED STATISTICS ON MERIT VARIABLES FOR 1973 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.069$)
	Nontenured (N=20)	Tenured (N=5)	Nontenured (N=20)	Tenured (N=5)	
books	1.050	1.600	1.932	0.894	-0.613
nat'l. journal articles	10.350	10.600	9.315	10.502	-0.053
local journal articles	5.800	6.600	5.606	5.595	-0.286
exhibits	0.100	0.000	0.308	0.000	0.714
awards and honors	0.200	0.000	0.616	0.000	0.715
professional fraternities	4.250	4.400	1.585	5.128	-0.116
civic organizations	0.500	0.000	0.761	0.000	1.446
professional registrations	0.700	0.400	1.081	0.548	0.595

TABLE 4-27
SELECTED STATISTICS ON MERIT VARIABLES FOR 1974 COHORTS TENURED AS PROFESSORS EVALUATED AT THE END OF ONE YEAR OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.131$)
	Nontenured (N=14)	Tenured (N=3)	Nontenured (N=14)	Tenured (N=3)	
books	0.714	1.000	2.164	1.732	-0.213
nat'l. journal articles	25.214	3.000	38.261	3.000	0.980
local journal articles	13.214	5.333	19.459	9.238	0.672
exhibits	0.357	0.000	1.336	0.000	0.451
awards and honors	1.000	2.333	1.359	2.517	-1.340
professional fraternities	3.571	3.000	2.793	1.732	0.335
civic organizations	0.429	1.000	0.514	1.000	-1.491
professional registrations	0.643	0.000	1.008	0.000	1.077

TABLE 4-28
SELECTED STATISTICS ON MERIT VARIABLES FOR 1974 COHORTS TENURED AS PROFESSORS EVALUATED AT THE END OF TWO YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=5)	Tenured (N=8)	Nontenured (N=5)	Tenured (N=8)	($t_{crit}=\pm 2.201$)
books	0.400	2.000	0.548	2.878	-1.210
nat'l. journal articles	29.200	15.375	29.465	17.549	1.072
local journal articles	24.200	5.000	35.989	8.418	1.483
exhibits	0.200	0.000	0.447	0.000	1.301
awards and honors	1.400	0.125	1.673	0.354	2.135
professional fraternities	4.600	4.000	3.975	3.854	0.270
civic organizations	0.400	0.375	0.548	0.744	0.065
professional registrations	0.600	0.625	0.894	0.916	-0.048

TABLE 4-29
SELECTED STATISTICS ON MERIT VARIABLES FOR 1974 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=14)	Tenured (N=5)	Nontenured (N=14)	Tenured (N=5)	($t_{crit}=\pm 2.110$)
books	0.357	0.400	0.723	0.548	-0.120
nat'l. journal articles	9.928	11.000	9.075	16.462	-0.183
local journal articles	6.929	6.000	4.711	8.031	0.314
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.429	0.600	0.806	1.342	-0.342
professional fraternities	5.143	2.200	1.966	1.789	2.933*
civic organizations	0.286	0.400	0.577	0.894	-0.329
professional registrations	0.571	0.000	1.095	0.000	1.145

n.d. -- no difference

*probability = $p \leq .05$ of chance occurrence

TABLE 4-30
SELECTED STATISTICS ON MERIT VARIABLES FOR 1974 COHORTS TENURED AS PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=8)	Tenured (N=5)	Nontenured (N=8)	Tenured (N=5)	($t_{crit}=\pm 2.201$)
books	0.375	1.000	1.000	1.414	-0.939
nat'l. journal articles	17.625	17.400	15.732	14.293	0.026
local journal articles	10.751	5.800	6.560	5.762	1.383
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.750	0.400	2.000	0.548	0.377
professional fraternities	4.125	3.800	0.866	3.347	0.267
civic organizations	0.250	0.400	0.667	0.548	-0.420
professional registrations	0.000	1.400	0.000	1.673	-2.434*

n.d. -- no difference

*probability = $p \leq .05$ of chance occurrence

TABLE 4-31
SELECTED STATISTICS ON MERIT VARIABLES FOR 1974 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF FOUR YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=111)	Tenured (N=8)	Nontenured (N=111)	Tenured (N=8)	($t_{crit}=\pm 1.980$)
books	0.171	0.250	0.570	0.463	-0.383
nat'l. journal articles	3.306	4.500	5.000	4.899	-0.653
local journal articles	3.495	3.875	4.506	4.155	-0.231
exhibits	0.090	0.000	0.611	0.000	0.415
awards and honors	0.315	0.000	1.104	0.000	0.804
professional fraternities	3.279	4.750	1.625	1.832	-2.454*
civic organizations	0.288	0.375	0.562	0.744	-0.414
professional registrations	0.306	0.125	0.818	0.354	0.620

*probability = $p \leq .05$ of chance occurrence

TABLE 4-32
SELECTED STATISTICS ON MERIT VARIABLES FOR 1974 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF FOUR YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=19)	Tenured (N=3)	Nontenured (N=19)	Tenured (N=3)	($t_{crit}=\pm 2.086$)
books	0.947	1.333	1.646	2.309	-0.360
nat'l. journal articles	14.053	13.333	14.419	3.055	0.085
local journal articles	7.579	2.667	5.644	0.577	1.476
exhibits	0.105	0.000	0.277	0.000	0.643
awards and honors	0.421	0.000	0.748	0.000	0.955
professional fraternities	5.158	5.333	0.997	3.786	-0.185
civic organizations	0.474	0.333	0.700	0.577	0.330
professional registrations	0.842	1.667	1.150	1.528	-1.113

TABLE 4-33
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS PROFESSORS EVALUATED AT THE END OF ONE YEAR OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=9)	Tenured (N=9)	Nontenured (N=9)	Tenured (N=9)	($t_{crit}=\pm 2.110$)
books	0.222	0.778	0.441	1.059	-1.454
nat'l. journal articles	10.889	12.667	10.764	15.721	-0.280
local journal articles	11.778	3.000	15.131	3.917	1.685
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	3.444	2.000	4.065	2.821	0.876
professional fraternities	5.222	4.778	3.308	3.057	0.296
civic organizations	0.444	0.444	0.726	0.843	0.000
professional registrations	0.444	0.889	0.726	1.135	-0.992

n.d. -- no difference

TABLE 4-34
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE CCMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 1.993$)
	Nontenured (N=102)	Tenured (N=4)	Nontenured (N=102)	Tenured (N=4)	
books	0.178	0.000	0.684	0.000	0.518
nat'l. journal articles	2.069	4.500	3.837	4.796	-1.233
local journal articles	2.578	1.750	8.192	2.872	0.201
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.304	0.000	1.310	0.000	0.462
professional fraternities	3.118	2.750	1.992	1.500	0.365
civic organizations	0.246	0.000	0.518	0.000	0.945
professional registrations	0.382	0.750	0.800	1.500	-0.871

n.d. -- no difference

TABLE 4-35
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=20)	Tenured (N=9)	Nontenured (N=20)	Tenured (N=9)	($t_{crit}=\pm 2.052$)
books	0.100	0.667	0.308	0.866	-2.627*
nat'l. journal articles	5.500	13.667	7.363	10.012	-2.478*
local journal articles	4.650	3.111	3.646	3.855	1.034
exhibits	0.550	1.000	2.460	2.345	-0.462
awards and honors	0.200	0.111	0.616	0.333	0.405
professional fraternities	3.850	4.111	2.159	2.619	-0.282
civic organizations	0.600	0.444	0.883	0.726	0.463
professional registrations	0.450	0.889	0.999	1.167	-1.041

*probability = $p \leq .05$ of chance occurrence

TABLE 4-36
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF FOUR YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=97)	Tenured (N=6)	Nontenured (N=97)	Tenured (N=6)	($t_{crit} = \pm 1.990$)
books	0.155	0.667	0.584	0.816	-2.037*
nat'l. journal articles	4.011	3.667	5.235	2.503	0.159
local journal articles	3.350	3.000	6.921	4.980	0.122
exhibits	0.928	0.333	8.473	0.816	0.171
awards and honors	0.268	0.333	0.750	0.516	-0.209
professional fraternities	3.402	3.333	1.865	2.066	0.087
civic organizations	0.247	0.500	0.597	0.548	-1.011
professional registrations	0.217	0.667	0.616	1.033	-1.663

*probability = $p \leq .05$ of chance occurrence

TABLE 4-37
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF FOUR YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.120$)
	Nontenured (N=16)	Tenured (N=2)	Nontenured (N=16)	Tenured (N=2)	
books	0.312	0.000	0.793	0.000	0.542
nat'l. journal articles	8.687	10.000	9.457	2.828	-0.191
local journal articles	6.812	14.500	7.574	0.707	-1.397
exhibits	0.125	0.000	0.500	0.000	0.344
awards and honors	12.937	1.000	49.893	1.414	0.329
professional fraternities	4.188	4.500	2.198	0.707	-0.195
civic organizations	0.250	0.000	0.577	0.000	0.597
professional registrations	0.562	0.500	1.094	0.707	0.077

TABLE 4-38
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF FIVE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=58)	Tenured (N=41)	Nontenured (N=58)	Tenured (N=41)	($t_{crit}=\pm 1.990$)
books	0.259	0.146	0.679	0.358	0.973
nat'l. journal articles	2.983	7.902	5.242	10.027	-3.176*
local journal articles	2.862	8.585	4.261	8.264	-4.501*
exhibits	0.069	0.195	0.496	0.813	-0.956
awards and honors	0.310	0.610	1.654	1.563	-0.909
professional fraternities	3.448	3.829	1.482	1.498	-1.254
civic organizations	0.310	0.439	0.545	0.673	-1.052
professional registrations	0.551	0.195	0.986	0.641	2.027*

*probability = $p \leq .05$ of chance occurrence

TABLE 4-39
SELECTED STATISTICS ON MERIT VARIABLES FOR 1975 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF FIVE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.101$)
	Nontenured (N=6)	Tenured (N=14)	Nontenured (N=6)	Tenured (N=14)	
books	1.000	0.786	2.400	1.968	0.244
nat'l. journal articles	10.000	10.714	10.431	10.269	-0.142
local journal articles	3.333	8.071	3.204	7.741	-1.430
exhibits	8.500	0.071	20.335	0.267	1.612
awards and honors	0.667	0.357	1.033	0.745	0.761
professional fraternities	3.833	3.929	1.602	1.141	-0.153
civic organizations	0.333	0.429	0.816	0.756	-0.255
professional registrations	1.167	0.429	1.602	1.158	1.166

TABLE 4-40
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=121)	Tenured (N=7)	Nontenured (N=121)	Tenured (N=7)	($t_{crit}=\pm 1.98$)
books	0.033	0.000	0.289	0.000	0.301
nat'l. journal articles	1.669	5.286	2.622	4.446	-3.400*
local journal articles	1.545	3.000	2.705	6.253	-1.260
exhibits	0.049	0.000	0.467	0.000	0.277
awards and honors	0.852	0.857	1.142	1.673	-0.011
professional fraternities	3.041	3.143	1.616	0.516	-0.166
civic organizations	0.405	0.714	0.718	0.983	-1.085
professional registrations	0.214	0.286	0.666	0.816	-0.275

*probability = $p \leq .05$ of chance occurrence

TABLE 4-41
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF THREE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=19)	Tenured (N=5)	Nontenured (N=19)	Tenured (N=5)	($t_{crit}=\pm 2.074$)
books	0.211	1.400	0.535	2.074	-2.346*
nat'l. journal articles	2.526	2.600	3.518	2.702	-0.043
local journal articles	1.158	6.600	1.573	5.857	-3.767*
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.789	1.200	1.134	1.789	-0.639
professional fraternities	2.579	4.400	1.610	1.817	-2.197*
civic organizations	0.421	0.000	0.769	0.000	1.204
professional registrations	0.579	0.200	1.427	0.447	0.578

n.d. -- no difference

*probability = $p \leq .05$ of chance occurrence

TABLE 4-42
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF FOUR YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=94)	Tenured (N=6)	Nontenured (N=94)	Tenured (N=6)	($t_{crit} = \pm 1.990$)
books	0.106	0.833	0.409	2.041	-2.833*
nat'l. journal articles	1.957	2.333	3.923	3.141	-0.230
local journal articles	2.373	4.167	8.494	4.916	-0.510
exhibits	0.000	0.000	0.000	0.000	n.d.
awards and honors	0.308	0.000	1.373	0.000	0.547
professional fraternities	2.979	2.833	1.934	2.401	0.177
civic organizations	0.266	0.167	0.561	0.408	0.424
professional registrations	0.341	0.667	0.825	1.033	-0.925

n.d. -- no difference

*probability = $p \leq .05$ of chance occurrence

TABLE 4-43
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF FOUR YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=17)	Tenured (N=4)	Nontenured (N=17)	Tenured (N=4)	($t_{crit}=\pm 2.093$)
books	0.059	0.250	0.243	0.500	-1.151
nat'l. journal articles	5.176	7.000	7.659	4.830	-0.451
local journal articles	4.471	4.250	4.064	1.708	0.105
exhibits	0.647	0.000	2.668	0.000	0.476
awards and honors	0.235	0.000	0.664	0.000	0.694
professional fraternities	4.000	4.250	1.620	3.202	-0.230
civic organizations	0.706	0.000	0.920	0.000	1.505
professional registrations	0.471	0.750	0.943	1.500	-0.478

TABLE 4-44
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF FIVE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs}
	Nontenured (N=51)	Tenured (N=44)	Nontenured (N=51)	Tenured (N=44)	($t_{crit}=\pm 1.990$)
books	0.176	0.159	0.523	0.680	0.138
nat'l. journal articles	3.373	5.159	4.213	6.168	-1.666
local journal articles	3.902	2.705	8.651	3.702	0.852
exhibits	0.019	2.023	0.131	12.959	-1.105
awards and honors	0.274	0.273	0.865	0.585	0.006
professional fraternities	3.667	3.273	1.836	1.872	1.034
civic organizations	0.274	0.227	0.601	0.605	0.379
professional registrations	0.274	0.159	0.683	0.526	0.908

TABLE 4-45
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSOCIATE PROFESSORS EVALUATED AT THE END OF FIVE YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.131$)
	Nontenured (N=8)	Tenured (N=9)	Nontenured (N=8)	Tenured (N=9)	
books	0.125	0.444	0.354	1.014	-0.843
nat'l. journal articles	5.875	10.222	8.855	9.897	-0.949
local journal articles	4.500	8.111	4.870	9.239	-0.988
exhibits	0.250	5.556	0.707	16.667	-0.896
awards and honors	0.500	0.333	0.926	1.000	0.356
professional fraternities	3.625	4.333	2.066	2.500	-0.631
civic organizations	0.000	0.444	0.000	0.726	-1.722
professional registrations	0.750	0.333	1.389	0.707	0.794

TABLE 4-46
SELECTED STATISTICS ON MERIT VARIABLES FOR 1976 COHORTS TENURED AS ASSISTANT PROFESSORS EVALUATED AT THE END OF SIX YEARS OF TENURE TRACK EXPERIENCE COMPARED WITH THEIR NONTENURED COHORTS

Variable	Means		Standard Deviations		t_{obs} ($t_{crit}=\pm 2.000$)
	Nontenured (N=51)	Tenured (N=8)	Nontenured (N=51)	Tenured (N=8)	
books	0.176	0.375	0.623	0.500	-0.859
nat'l. journal articles	2.627	2.876	5.710	3.321	-0.120
local journal articles	2.686	3.250	4.645	2.759	-0.333
exhibits	0.078	0.000	0.560	0.000	0.391
awards and honors	0.353	0.125	1.864	0.333	0.343
professional fraternities	3.059	3.375	1.302	1.000	-0.655
civic organizations	0.314	0.125	0.583	0.333	0.890
professional registrations	0.392	0.250	0.874	0.667	0.439

Summary of Results Obtained From Student's t Statistic

Twenty-three two-group comparisons were done using Student's t statistic to test for significant differences on each of eight merit variables. Since both groups in some instances had means and standard deviations of zero, out of the sufficiently large 184 comparisons only 172 were feasible. If all possible combinations of rank and years experience had had at least thirteen members, 600 t tests would have been examined.

Of the 172 t tests conducted, fifteen reflected differences which were larger than would be expected in 95 percent of group comparisons of that size. Table 4-47 presents these results, and the group with the larger average value on the variable. The means of the tenured group exceeded those of the nontenured group in twelve of the fifteen significant findings.

TABLE 4-47
SUMMARY OF SIGNIFICANT FINDINGS FROM STUDENT'S T STATISTIC

Year	Rank	Completed Years of Experience	Merit Variable	Group With Larger Mean
1972	Professor	1	National Journal Articles	Nontenured
1974	Associate Professor	3	Professional Fraternities	Nontenured
	Professor	3	Professional Registrations	Tenured
	Assistant Professor	4	Professional Fraternities	Tenured
1975	Professor	3	Books	Tenured
			National Journal Articles	Tenured
	Assistant Professor	4	Books	Tenured
	Assistant Professor	5	National Journal Articles	Tenured
			Local Journal Articles	Tenured
			Professional Registrations	Nontenured
1976	Assistant Professor	3	National Journal Articles	Tenured
	Associate Professor	3	Books	Tenured
			Local Journal Articles	Tenured
			Professional Fraternities	Tenured
	Assistant Professor	4	Books	Tenured

Summary of All Group Means

Many tenured groups were too small for testing their averages against the average values of their nontenured cohorts. Tables 4-48 through 4-53 present all group means derived from this study. Each table presents one academic rank and one tenure status, such as nontenured assistant professors, and documents the years of experience on which evaluation would have been based, the data file year from which the merit data were taken, the group size for that cohort, and finally, the eight means derived from the merit measures.

TABLE 4-48

COMPARISON OF MEANS -- NONTENURED ASSISTANT PROFESSORS

Years of Experience on Which Evaluation Would Have Been Based	Raw Data File Year	Data File Year From Which Merit Comparisons Were Taken	N	Books	National Journal Articles	Local Journal Articles	Exhibits	Awards and Honors	Professional Fraternities	Civic Organizations	Professional Registrations
0	1972	1972	81	.000	1.025	.568	.000	.000	2.222	.160	.222
	1973	1973	103	.039	1.156	1.126	.000	.583	2.408	.281	.088
	1974	1974	113	.132	1.053	2.062	.009	.478	2.159	.106	.354
	1975	1975	6	.167	1.667	1.667	.000	.000	1.000	.167	.000
	1976	1976	1	.000	1.000	2.000	.000	.000	2.000	.000	.000
1	1972	1971	110	.027	1.027	.800	.018	.000	2.146	.073	.018
	1973	1972	101	.019	1.505	1.713	.019	.268	2.654	.179	.278
	1974	1973	122	.041	1.107	1.123	.000	.688	2.623	.336	.140
	1975	1974	147	.136	1.850	1.980	.013	2.653	2.613	.102	.354
	1976	1975	6	.000	2.000	1.667	.000	.000	.667	.167	.000
2	1972	1971	118	.102	2.169	2.169	.000	.000	3.212	.178	.170
	1973	1972	110	.073	2.609	2.382	.800	.136	3.064	.146	.155
	1974	1973	108	.065	1.704	2.167	.000	.259	2.769	.186	.343
	1975	1974	131	.038	1.848	1.603	.038	.863	3.038	.412	.206
	1976	1975	134	.135	1.850	1.664	.015	2.911	2.605	.112	.358
3	1973	1972	125	.144	3.328	3.128	.080	.192	3.360	.248	.232
	1974	1973	108	.111	2.861	2.389	1.287	.176	3.185	.176	.148
	1975	1974	102	.178	2.069	2.578	.000	.304	3.118	.246	.382
	1976	1975	121	.033	1.669	1.545	.049	.852	3.041	.405	.214
4	1974	1973	111	.171	3.306	3.495	.090	.315	3.279	.288	.306
	1975	1974	97	.155	4.011	3.350	.928	.268	3.402	.247	.217
	1976	1975	94	.106	1.957	2.373	.000	.308	2.979	.266	.341
5	1975	1974	58	.259	2.983	2.862	.069	.310	3.448	.310	.551
	1976	1975	51	.176	3.373	3.902	.019	.274	3.667	.274	.274
6	1976	1975	51	.176	2.627	2.686	.078	.353	3.059	.314	.392

TABLE 4-49

COMPARISON OF MEANS -- TENURED ASSISTANT PROFESSORS

Years of Experience on Which Evaluation Would Have Been Based	Raw Data File Year	Data File Year From Which Merit Comparisons Were Taken	N	Books	National Journal Articles	Local Journal Articles	Exhibits	Awards and Honors	Professional Fraternities	Civic Organizations	Professional Registrations
1	1973	1972	1	.000	14.000	4.000	.000	.000	1.000	.000	2.000
2	1972	1971	1	.000	.000	.000	.000	.000	2.000	.000	.000
	1975	1974	1	.000	17.000	9.000	.000	1.000	4.000	.000	.000
	1976	1975	1	.000	2.000	4.000	.000	1.000	10.000	.000	1.000
3	1973	1972	1	.000	2.000	3.000	.000	.000	1.000	.000	.000
	1974	1973	2	.000	10.000	4.500	.000	.500	2.500	.500	.000
	1975	1974	4	.000	4.500	1.750	.000	.000	2.750	.000	.750
	1976	1975	7	.000	5.286	3.000	.000	.857	3.143	.714	.286
4	1974	1973	8	.250	4.500	3.875	.000	.000	4.750	.375	.125
	1975	1974	6	.667	3.667	3.000	.333	.333	3.333	.500	.667
	1976	1975	6	.833	2.333	4.167	.000	.000	2.833	.167	.667
5	1975	1974	41	.146	7.902	8.585	.195	.610	3.829	.439	.195
	1976	1975	44	.159	5.159	2.705	2.023	.273	3.273	.227	.159
6	1976	1975	8	.375	2.876	3.250	.000	.125	3.375	.125	.250

TABLE 4-50

COMPARISON OF MEANS -- NONTENURED ASSOCIATE PROFESSORS

Years of Experience on Which Evaluation Would Have Been Based	Raw Data File Year	Data File Year From Which Merit Comparisons Were Taken	N	Books	National Journal Articles	Local Journal Articles	Exhibits	Awards and Honors	Professional Fraternities	Civic Organizations	Professional Registrations
0	1972	1972	21	.095	3.238	2.190	.000	.000	3.286	.381	.238
	1973	1973	19	.421	1.895	2.053	.000	.263	2.684	.368	.579
	1974	1974	23	.652	4.043	2.174	.000	.696	2.435	.217	.522
	1975	1975	1	.000	4.000	2.000	.000	.000	3.000	1.000	.000
1	1972	1971	14	.072	6.286	5.215	.000	.000	3.571	.072	.072
	1973	1972	26	.231	6.846	2.962	.462	.231	4.154	.462	.462
	1974	1973	21	.455	2.318	2.227	.000	.636	3.136	.455	.545
	1975	1974	29	.655	6.621	1.862	.103	1.172	3.345	.207	.966
2	1972	1971	24	.750	6.292	4.750	.042	.000	3.875	.375	.542
	1973	1972	16	.375	10.125	6.250	.000	.562	4.187	.375	.375
	1974	1973	26	.230	6.846	3.693	.577	.115	4.577	.500	.538
	1975	1974	22	.455	2.455	2.455	.045	.819	3.272	.455	.546
	1976	1975	25	.720	7.280	1.920	.120	1.200	3.240	.280	1.160
3	1973	1972	20	1.050	10.350	5.800	.100	.200	4.250	.500	.700
	1974	1973	14	.357	9.928	6.929	.000	.429	5.143	.286	.571
	1975	1974	20	.100	5.500	4.650	.550	.200	3.850	.600	.450
	1976	1975	19	.211	2.526	1.158	.000	.789	2.579	.421	.579
4	1974	1973	19	.947	14.053	7.579	.105	.421	5.158	.474	.842
	1975	1974	16	.312	8.687	6.812	.125	12.937	4.188	.250	.562
	1976	1975	17	.059	5.176	4.471	.647	.235	4.000	.706	.471
5	1975	1974	6	1.000	10.000	3.333	8.500	.667	3.833	.333	1.167
	1976	1975	8	.125	5.875	4.500	.250	.500	3.625	.000	.750

TABLE 4-51

COMPARISON OF MEANS -- TENURED ASSOCIATE PROFESSORS

Years of Experience on Which Evaluation Would Have Been Based	Raw Data File Year	Data File Year From Which Merit Comparisons Were Taken	N	Books	National Journal Articles	Local Journal Articles	Exhibits	Awards and Honors	Professional Fraternities	Civic Organizations	Professional Registrations
2	1973	1972	1	.000	5.000	.000	.000	.000	2.000	.000	.000
	1974	1973	1	.000	4.000	.000	.000	.000	.000	.000	.000
	1976	1975	1	1.000	5.000	4.000	.000	2.000	4.000	.000	2.000
3	1973	1972	5	1.600	10.600	6.600	.000	.000	4.400	.000	.400
	1974	1973	5	.400	11.000	6.000	.000	.600	2.200	.400	.000
	1975	1974	9	.667	13.667	3.111	1.000	.111	4.111	.444	.889
	1976	1975	5	1.400	2.600	6.600	.000	1.200	4.400	.000	.200
4	1974	1973	3	1.333	13.333	2.667	.000	.000	5.333	.333	1.667
	1975	1974	2	.000	10.000	14.500	.000	1.000	4.500	.000	.500
	1976	1975	4	.250	7.000	4.250	.000	.000	4.250	.000	.750
5	1975	1974	14	.786	10.714	8.071	.071	.357	3.929	.429	.429
	1976	1975	9	.444	10.222	8.111	5.556	.333	4.333	.444	.333

TABLE 4-52

COMPARISON OF MEANS -- NONTENURED PROFESSORS

Years of Experience on Which Evaluation Would Have Been Based	Raw Data File Year	Data File Year From Which Merit Comparisons Were Taken	N	Books	National Journal Articles	Local Journal Articles	Exhibits	Awards and Honors	Professional Fraternities	Civic Organizations	Professional Registrations
0	1972	1972	11	.727	13.000	6.455	.000	.000	5.636	.273	.636
	1973	1973	13	1.000	22.615	10.538	.000	1.231	3.385	.538	.385
	1974	1974	15	.667	5.333	12.733	.000	1.067	3.800	.200	.333
1	1972	1971	18	.500	13.400	10.150	.000	.000	5.050	.350	.050
	1973	1972	11	1.273	17.455	13.727	.000	.273	4.455	.364	1.000
	1974	1973	14	.714	25.214	13.214	.357	1.000	3.571	.429	.643
	1975	1974	9	.222	10.889	11.778	.000	3.444	5.222	.444	.444
2	1972	1971	4	.000	17.750	6.000	.000	.000	3.750	.250	.000
	1973	1972	14	.500	15.214	7.929	.000	.500	4.143	.286	.286
	1974	1973	5	.400	29.200	24.200	.200	1.400	4.600	.400	.600
	1975	1974	7	.000	21.500	5.875	.125	1.250	3.375	.250	1.375
	1976	1975	2	.000	9.000	3.500	.000	.500	4.000	.500	.000
3	1973	1972	3	.000	7.333	24.000	.000	.333	5.000	.333	.000
	1974	1973	8	.375	17.625	10.751	.000	.750	4.125	.250	.000
	1975	1974	2	.000	37.500	44.000	.000	1.000	5.500	.500	1.000
	1976	1975	6	.000	28.667	7.500	.167	1.000	2.833	.167	1.000
4	1974	1973	2	.000	2.000	14.000	.000	1.500	4.000	.500	.000
	1975	1974	6	.625	25.000	10.250	.000	.375	4.250	.375	.250
	1976	1975	1	.000	73.000	88.000	.000	2.000	7.000	.000	2.000
5	1975	1974	2	.000	2.000	14.000	.000	1.500	4.000	.500	.000
	1976	1975	2	1.500	47.500	21.500	.000	.000	7.500	.000	.000

TABLE 4-53

COMPARISON OF MEANS -- TENURED PROFESSORS

Years of Experience on Which Evaluation Would Have Been Based	Raw Data File Year	Data File Year From Which Merit Comparisons Were Taken	N	Books	National Journal Articles	Local Journal Articles	Exhibits	Awards and Honors	Professional Fraternities	Civic Organizations	Professional Registrations
0	1975	1975	1	.000	3.000	28.000	.000	3.000	4.000	1.000	.000
	1976	1976	2	1.000	14.000	8.000	.000	.000	2.000	1.000	.000
1	1972	1971	14	.857	5.143	6.929	.000	.000	3.429	.214	.143
	1973	1972	3	2.000	30.333	3.000	.000	.000	4.667	.000	.000
	1974	1973	3	1.000	3.000	5.333	.000	2.333	3.000	1.000	.000
	1975	1974	9	.778	12.667	3.000	.000	2.000	4.778	.444	.889
2	1972	1971	3	2.667	9.333	14.000	.000	.000	6.333	.667	.667
	1973	1972	5	1.000	22.400	4.200	.000	.200	5.200	.400	.200
	1974	1973	8	2.000	15.375	5.000	.000	.125	4.000	.375	.625
	1975	1974	3	.000	27.667	37.667	.000	.000	6.667	1.333	1.333
	1976	1975	5	.400	16.000	18.800	.000	6.200	7.800	.600	.800
3	1973	1972	1	.000	82.000	2.000	.000	.000	2.000	.000	.000
	1974	1973	5	1.000	17.400	5.800	.000	.400	3.800	.400	1.400
	1975	1974	3	.667	25.667	12.667	.333	1.667	5.333	.333	.333
	1976	1975	1	.000	18.000	7.000	.000	.000	4.000	1.000	.000
4	1974	1973	1	.000	18.000	48.000	.000	.000	7.000	.000	.000
	1975	1974	2	.000	3.000	7.000	.000	3.000	4.500	.000	.000
5	1976	1975	3	.000	30.000	10.333	.000	.667	5.667	1.000	.667
6	1976	1975	1	.000	1.000	.000	.000	.000	4.000	.000	.000

CHAPTER FIVE
IMPLICATIONS OF THE STUDY AND RECOMMENDATIONS FOR FURTHER RESEARCH

Discussion of Results

The newcomer to any social structure faces evaluation. In the best of circumstances, the evaluative criteria are acknowledged by all in advance. This study has focused on the evaluation for tenure award of "new academicians" in one large university. The "new academicians" in this study have been classified by their managers as having applicable university experience which began between 1970 and 1976. The purposes of this study have been:

1) to examine the differences between the "new academicians" attaining tenure and those who do not during this seven year period, based on data gleaned from personnel files managed by the Office of Academic Affairs at the university, and

2) to examine the extent to which sex of these faculty members has influenced the tenure award decision.

Several researchers (Wilson et al., 1973; Keast and Macy, 1973; Dressel, 1963), discussed in the literature review in Chapter Two, state that the probability of attaining tenure is quite high. The present study has been conducted without prior knowledge of which members of the faculty were considered for tenure at the university studied in any of the five years examined. Among this university's population of "new academicians" selected for study, however, the proportion attaining tenure was quite low--specifically, between 4 and 15 percent. If these newly tenured "new academicians"

represent the only members of the population considered for tenure, two implications seem likely:

1) the evaluative data from these faculty members should reflect a significantly higher level of performance on "merit" measures, after controlling for "experience," and

2) to attain tenure during the first seven years of university experience is highly unlikely.

The literature review indicated that good teaching, research, publications, professionalism, community service, and national reputation are the most-quoted indicators of faculty quality. This study has examined the publications (books, national journal articles and local journal articles), professionalism (professional fraternity memberships), community service (civic organization memberships) and national reputation (professional registrations, awards, honors and exhibits) of these "new academicians." In addition, academic rank and years in tenure track were examined and controlled so that the significance of the independent contribution of merit measures could be determined. According to one observed test statistic (Rao's T_2), the combined merit measures significantly increased the discriminatory ability possible from the use of experience variables alone.

One complication of the observed test statistic is that it has been computed from discriminant functions which were adjusted for sample sizes in accordance with Bayesian theory of prior probabilities. This means that each discriminant function was generated with the acknowledgment a priori that the probability of group membership was

unequal. Each year's prior probabilities were generated from actual group sizes. This adjustment reflected the average probabilities within each year's data file.

As Tables 4-7 through 4-11 demonstrate, the probability of being granted tenure varies with the number of years in tenure track; for example, the likelihood of being hired with tenure at this university is practically zero, having happened to only three faculty members in the five years studied. To be tenured at the conclusion of one's fifth year, however, is much more likely. From Table 4-10, of the 121 tenure track faculty concluding their fifth year, 55 received tenure. Similarly, Table 4-11 shows 56 faculty ending their fifth year with tenure, and 61 nontenured fifth-year faculty. The disparate sizes of tenured and nontenured groups within some of the columns of these tables are more unstable estimates of Bayesian probabilities than the total of all columns within the calendar year. Although not ideal, the prior probability based on the total number of faculty (collapsing the information regarding years in tenure track) was the more stable alternative.

For each year examined, a high negative correlation was found between the two dichotomous indicators of academic rank. This can be explained by reviewing Tables 4-7 through 4-11 for the distribution of ranks, and considering that full professors, constituting the group with fewest members, were coded zero for both rank variables. These same two variables were consistently weighted most heavily in each

discriminant function. Years in tenure track, in contrast, is not significantly intercorrelated with the other two "experience" variables, nor with any of the "merit" variables.

Significant negative intercorrelations exist between the rank of Assistant Professor and number of national journal articles published, for each year studied. For three of the five years analyzed, this rank is also significantly intercorrelated with number of books published, also in a negative direction. Local journal articles are negatively intercorrelated with this same dichotomous indicator of academic rank. The rank of Assistant Professor is associated with lower values on all merit variables.

The second dichotomous rank variable differentiates Associate Professor from others. This variable shows no significant intercorrelations with any of the merit measures in the five years examined. It appears that no strong associations exist between the rank of Associate Professor and any of the merit variables in these data.

The following merit measures are consistently intercorrelated for these data during 1972 to 1976:

(A) national journal articles

(B) local journal articles

(C) professional fraternities

That is, individuals with high values on one of these variables tend to have high values on the other two, and individuals with low values on one tend to have low values on the other two.

Tatsuoka (1970) and others have warned of possible distortion of group differences indicated by a discriminant function when the independent variables are intercorrelated. Specifically, group differences tend to increase as intercorrelations among the variables increase. To examine the relative importance of a variable with the effects of the other variable controlled, the actual weights of the aforementioned significant variables are summarized in Table 5-1 from the equations quoted in the previous chapter. The column referrents are as follows: (A) assistant professor, (B) associate professor, (C) years in tenure track, (D) national journal articles, (E) local journal articles, and (F) professional fraternities.

TABLE 5-1
FUNCTION COEFFICIENTS FOR SIGNIFICANTLY INTERCORRELATED VARIABLES

Year	Function	(A)	(B)	(C)	(D)	(E)	(F)
1972	D_p	-1.034	-1.028	.139			
	D_{p+q}	1.050	1.027	-.126	.354	-.129	.124
1973	D_p	-1.075	-.723	.361			
	D_{p+q}	-.835	-.428	.234	.526	-.353	.064
1974	D_p	-1.014	-.949	.464			
	D_{p+q}	1.030	.921	-.421	-.041	.180	-.032
1975	D_p	-.949	-.484	.828			
	D_{p+q}	.665	.319	-.718	-.190	-.148	-.105
1976	D_p	-1.056	-.658	.817			
	D_{p+q}	-.822	-.538	.662	.098	-.058	.341

Tatsuoka recommends looking at those weights whose absolute values are no smaller than half of the largest coefficient. By far, the variable with the largest coefficient is the dichotomous measure indicating the rank of assistant professor. (The reader may well question its standardized coefficients with weights greater than 1.00. These are considered to be within rounding error of 1.00.)

This criterion reduces substantially the number of variables which meaningfully separate the two groups. Only in the year 1973 does even one merit measure, national journal articles, contribute significantly to the separation of the two groups.

In summary, among the variables which were moderately intercorrelated, the discriminant functions indicate that the academic ranks of assistant and associate professors are the two most powerful measures separating the two groups. Using Tatsuoka's method, the interactive merit variables have little to add to the discrimination between tenured and nontenured faculty.

Several variables which were chosen as indicators of merit did not correlate significantly with the other variables in the equations. Low intercorrelations sometimes indicate independence which may contribute substantially to group membership, thus increasing the overall discrimination of the equation. Their discriminant function weights are summarized by year in Table 5-2. No significant influence is apparent.

TABLE 5-2
COEFFICIENTS OF SELECTED MERIT VARIABLES

Variable	1972	1973	1974	1975	1976
books	-.218	.231	-.287	-.077	.169
exhibits	.012	.003	.032	.026	.316
awards and honors	na	-.149	.076	.038	.018
civic organizations	-.008	-.130	-.108	-.079	-.085
professional registrations	.032	-.161	-.043	.048	-.182

Multiple regression equations, predicting the value of each merit variable using experience variables, tenure status, and sex were presented in Tables 4-19 through 4-23. The largest coefficient of determination (R^2) was .263, which signifies that 26.3 percent of the variance in the values of national journal articles in 1973 could be explained by the two dichotomous indicators of rank combined with years in tenure track, sex, and tenure status. Percent of explained variance was below 25 percent for each of the other merit measures in each year, based on these same independent variables.

The unstandardized coefficients generated by these same regression equations raise some intriguing points. The 1972 data were discussed in Chapter Four. The predictor, tenure status, coded as a dichotomous variable, permitted examination of the difference between the mean of the tenured group and the mean of the nontenured.

A negative coefficient of this variable signifies that the tenured group averaged less than the nontenured group.

In 1972, the nontenured group average exceeded that of the tenured group on six of the eight merit variables. The 1973 data reflected the same result, although the tenured group averaged 8.508 more national journal articles than the nontenured group.

This counter-intuitive trend is reversed for the years 1974 through 1976. The tenured group averaged 0.754 more national journal articles than the nontenured group in 1974, while the nontenured group mean for local journal articles exceeded that of the tenured group by 2.431. Overall, the tenured group mean exceeded that of the nontenured group for five of the eight variables in 1974. In 1975, tenured faculty published an average of 3.194 more national and 2.550 more local journal articles than did the nontenured group. Six of the eight merit variables showed coefficients for tenure status which indicated that the tenured group means were larger than those of the nontenured group in 1975. For 1976, the final year studied, this same trend was found, although the size of the differences between means was small.

To continue the 1976 example, the regression coefficients for the two independent variables of academic rank projecting the two dependent variables, national and local journal articles, are much larger than the tenure status coefficients in those same equations. For purposes of discussion, a comparison is presented in Table 5-3

of the projected number of national journal articles published by male assistant, associate, and full professors, both tenured and nontenured, with one year of tenure track experience, in 1976. The reader is reminded that this projection actually determined only 16.5 percent of the variance in the data analyzed. Since the negative figures would be considered to be zero in a real case, it becomes apparent that little real difference exists among the six categories of this example.

TABLE 5-3
PROJECTION EXAMPLE -- 1976 NATIONAL JOURNAL ARTICLES BY RANK AND TENURE STATUS OF MALE FACULTY COMPLETING ONE YEAR

	Nontenured	Tenured
Assistant Professor	-15.10	-13.98
Associate Professor	-11.54	-10.42
Professor	1.12	1.45

The next step in this analysis was to consider the actual differences existing between tenured and nontenured faculty members of the same rank and years of experience. The statistical test of significance was the t test, performed on the 23 pairs of groups for which sample size exceeded thirteen. The t statistic tested the difference between the group values on each merit variable. Although 172 t tests were conducted, only sixteen of them resulted in a judgment of statistically significant difference. Table 4-47 summarized the sixteen findings.

One merit variable of ten found to separate the two groups was number of national journal articles published. In 1972, however, the nontenured professors actually had a higher average number published than did tenured professors with one completed year of tenure track experience. Of the four significant findings for this merit variable, three indicated that the tenured group produced significantly more than the nontenured group.

Four statistically significant differences were indicated for the merit measure, number of professional fraternity memberships. One of these four, 1974 associate professors, also indicated that the nontenured group actually averaged more memberships than did the tenured group. Said differently, three tenured groups (out of 23) had significantly more professional fraternity memberships than their nontenured counterparts.

The publication of books successfully differentiated tenured from nontenured faculty in four instances. In each test, the tenured group averaged more than the nontenured. This finding held across all three ranks.

The average number of local journal articles published by tenured faculty exceeded the nontenured average in two instances. The statistically significant differences existed between (1) tenured and nontenured assistant professors who had completed five years in tenure track prior to 1975, and (2) tenured and nontenured associate professors with three years' tenure track experience prior to 1976.

To view these data from a different perspective, Table 4-47 is reorganized in Table 5-4 so as to focus on the interaction of number of completed years of experience and academic rank of the tenured faculty whose merit data were found to be statistically larger than the data of their nontenured counterparts. The reader is reminded that publications were measured as books, national journal articles and local journal articles; recognition was measured by awards, honors, exhibits, and professional registrations; service was measured by civic organizations; and memberships were measured by professional fraternities.

TABLE 5-4
TYPE OF MERITORIOUS PERFORMANCE EXEMPLIFIED BY THE SUCCESSFUL TENURE CANDIDATES OF VARIOUS RANKS AND EXPERIENCE

Completed Years of Experience	Rank	Type of Merit Variable*
3	Assistant Professor	publications
	Associate Professor	publications, memberships
	Professor	publications, recognition
4	Assistant Professor	publications, memberships
5	Assistant Professor	publications

*refer to paragraph one of page 160 for explanation of types

Table 5-5 presents a more provocative analysis of the results of this portion of the study. It addresses the question of which types of meritorious performance did not distinguish successful tenure

candidates from their nontenured counterparts--that is, which types of variables characterize the 156 findings of no significant difference. The same format is used in Table 5-5 as in Table 5-4.

TABLE 5-5
TYPE OF MERITORIOUS PERFORMANCE FOR WHICH NO DIFFERENCE WAS FOUND BETWEEN SUCCESSFUL TENURE CANDIDATES AND THEIR NONTENURED COUNTERPARTS

Completed Years of Experience	Rank	Type of Merit Variable*
1	Professor	publications, recognition, service, memberships
2	Professor	publications, recognition, service, memberships
3	Assistant Professor	publications, recognition, service, memberships
	Associate Professor	publications, recognition, service, memberships
	Professor	publications, service, memberships
4	Assistant Professor	publications, recognition, service, memberships
	Associate Professor	publications, recognition, service, memberships
5	Assistant Professor	recognition, service, memberships
	Associate Professor	publications, recognition, service, memberships
6	Assistant Professor	publications, recognition, service, memberships

*refer to paragraph one of page 160 for explanation of types

Several cautions warrant consideration as Tables 5-4 and 5-5 are compared. In the instances of identical entries in parallel classifications (e.g., three years of experience, assistant professors, publications are listed on both tables), the apparent inconsistency is caused by the fact that statistical significance was found for this type of meritorious performance in some calendar years but not in other calendar years.

Another caution is that sample sizes for the t tests varied greatly. Small samples are generally considered less stable than large samples as repeated sampling is conducted. The t statistic was chosen in order to address this concern. Although 172 t tests were performed, a thorough examination of all possible combinations of academic rank and completed years of experience in tenure track would require 600 t tests for the eight merit variables studied here. Furthermore, the probability of being awarded tenure varies with the number of years completed in tenure track, increasing as the years increase up to five, declining again thereafter. These cautions temper somewhat the finding that only twelve of the 172 t tests showed the tenured group to average significantly higher than the nontenured group.

Validity of Indicators

A fundamental question relevant here was asked at the beginning of this study:

> Are these indicators valid, in terms of their discriminating power between tenured and nontenured faculty at the time of tenure award?

According to Rao's T_2, the equation containing both merit and experience variables increased the discrimination possible from an equation containing only experience variables, for each of the five years studied. The coefficients from both equations in each year indicate that academic rank is the largest determinant of tenure status, whether or not the merit variables are entered.

The Tatsuoka criterion led to the conclusion that just one merit variable, national journal articles, in one year, 1973, contributed substantially to the separation of tenured and nontenured faculty. Tables 4-25 and 4-26 detailed the results observed for the two samples of sufficient size to compare using Student's t statistic (professors with two completed years in tenure track and associate professors with three completed years in tenure track). No significant difference was found between tenured and nontenured means on the variable, number of national journal articles published. Yet, Table 4-14 details the total 1973 within groups correlation matrix, which indicates that national journal articles were negatively intercorrelated with the rank of assistant professor at the .01 level of significance. Said differently, assistant professors tended to have fewer national journal articles published than did both associate and full professors, regardless of tenure status. Indeed this is the case, as the data in Tables 4-48 through 4-53 confirm.

The same variable in 1973 had the largest coefficient of determination (26.3 percent) computed by any of the forty multiple

regression equations derived for the merit variables. Yet, this meager coefficient of determination indicates that almost 75 percent of the variance in the data for this variable could not be explained. Indeed, none of the merit variables independently discriminate tenure status for all ranks, although substantial differences are apparent among the three ranks of faculty members (see Tables 4-48 through 4-53).

The question regarding validity raised in the first chapter must be answered with ambiguity. Based on the tested comparisons, publications sometimes separated tenured from nontenured faculty in a predictable manner. The frequency with which no significant differences were found between tested groups is much more interesting, if disquieting. For the many groups not compared (due to insufficient sizes of comparison groups), nothing conclusive can be offered.

Among nontenured faculty members, a strong positive relationship exists between academic rank and production of meritorious works. Less than one-third of the potential tenure-status-based comparisons could be performed. Of the two-group comparisons tested, more than 90 percent failed to reject the null hypothesis of no difference. Preliminary indications are that merit variables discriminate among ranks in these data, but not between the tenure status dichotomy within rank and completed years in tenure track.

A quote from Rozeboom is helpful here:

> ...the primary aim of scientific experiment is not to precipitate decisions, but to make an appropriate adjustment in the degree to which one accepts, or believes, the hypothesis or hypotheses being tested. (1960, p. 421)

The apparent conflict between a significant result derived from Rao's T_2 in each of the five years' data investigations and the many nonsignificant results of the Student's t tests can be explained by the statements of the previous paragraph. Widely disparate sample sizes and strong positive interactions between academic ranks and merit variables combine to influence the overall Rao's T_2, even though Bayesian prior probabilities are assigned to the discriminant functions. In the two-group Student's t tests, the same academic rank characterizes both groups, and in over 90 percent of the tests, no significant difference was found.

The practical significance of the results from Rao's T_2 has been diminished by the results of the Student's t tests. Similarly, the fact that only one-third of the possible Student's t tests could be performed lessens the practical significance of so many nonsignificant results. The large unexplained variances of the merit variables when used as dependent variables in multiple regression equations indicated the degree of uncertainty remaining, even though academic rank and tenure status were predictors in these equations. The largest coefficient of determination was for national journal articles, based on 1973 groups. By subtracting its coefficient,

or percent of variance explained, from 1.00 (100 percent of variance), the unexplained portion of variance was 73.7 percent. It is hoped that continued research will further refine these results.

Implications for Affirmative Action

Another question addressed by this study was:

> What progress has been made with regard to affirmative action implications of attaining tenure, particularly for female faculty members?

In Chapter Four, the regression coefficients for the sex variable in each of the five years analyzed indicated that sex did not significantly affect the prediction of tenure status, when both experience and merit variables were controlled. Again, small sample sizes restrict the power with which tenure status could be explained by sex of the faculty member. Due to the fact that more than 80 percent of the nontenured faculty, and approximately 90 percent of the tenured faculty in this study are males, it is not surprising to find so little association between sex and tenure status. There is simply not enough representation from females to allow a substantial reduction in the error term related to tenure status.

Among new academicians attaining tenure, it is apparent that, in this study, men were successful candidates for tenure status with fewer years in tenure track and with lower ranks than women. In the multiple regression equations predicting merit measures, the sex variable indicated that female faculty members averaged slightly fewer

journal articles and slightly more awards, honors, professional fraternity memberships, and civic organization memberships.

Given the substantial differences in sample sizes based on sex of faculty members, no stable conclusion should be drawn from these data. These trends bear watching through more current years.

Indications for Faculty Development

The first chapter of this study also presented the following question for investigation:

> Do these variables discriminate in a way which would indicate that growth is valued?

Ideally, this question would be addressed by tracking the development of individual faculty members, deriving change scores on each merit variable for each year that the faculty member is in the data file, and comparing the changes exhibited by nontenured faculty with those of successful candidates for tenure. This was not feasible in the present study.

Another way of addressing this same question, however, is to examine the group means of nontenured faculty throughout the years to see if the group means increase as the five years progress. This process would be repeated for the newly tenured group averages. By controlling for academic rank and years in tenure track, the changing profile of faculty fitting the various "experience" combinations can be examined. Again referring to Tables 4-48 through 4-53, no trend toward increasing averages is apparent when years of experience and academic rank are controlled.

Implications of the Usefulness of a Mixed Model of Merit and Experience Variables

A related question raised in Chapter One was:

> To what extent does a mixed model of merit and experience variables improve our understanding of the process of attaining tenure? How does such a mixed model change over time?

Measures of publication, professionalism, community service and national reputation have been analyzed for both tenured and nontenured faculty members in search of differences which might indicate the important qualities exhibited by faculty who successfully attain tenure, and to what extent these values have changed over time.

A mixed model of merit and experience variables has improved our ability to discriminate tenured from nontenured faculty, as Rao's T_2 indicates. The disparity of group sizes within combinations of rank, years in tenure track, and tenure status has limited the generalizability of this result. Through the time period, 1970 to 1976, the characteristics studied have been unstable, prohibiting any clear statement of time-based change.

In the 172 comparisons tested by Student's t statistic, only twelve showed a significantly higher level of performance for tenured faculty. This fact does not substantially improve our knowledge of the factors leading to the tenure award decision. The evaluative criteria for acquisition of tenure remain evasive. Two-thirds of the possible comparisons could not be analyzed by Student's t statistic, yet resulted in a finding of statistical significance using Rao's T_2.

Byse and Joughin maintain:

> When the particular situation is a decision of tenure, a complex of facts and value systems becomes relevant: the traditions and standards of the institution, the experience and wisdom of the judges, and the merits of the person being judged. The result is hardly something to be measured. This is as it should be in the delicate operation of assessing a professional person. (1959, p. 29)

Among the one-third analyzed by Student's t statistic, the majority of the tests failed to indicate that the merits of the person who is successful in his or her pursuit of tenure were relevant. Further investigation of this finding would be fruitful.

Suggestions for Further Research and Advice to Administrators

Three final questions addressed in this study are:

(1) Is growth, or increased production, valued more than absolute number of merit measures?

(2) If a decision is made to achieve a steady-state ratio between tenured and nontenured faculty, is a steady-state achieved among production of "meritorious" works?

(3) To what extent do central and decentral administrators rely on these data as supporting documentation for decisions to award tenure?

As stated in Chapter One, the statistical techniques used here do not permit significance testing of these questions. The only direct way to investigate the first question would be to examine longitudinal data kept intact on an individual basis and examined by methods similar to those used in Markov Chain analysis. Tables 4-48 through 4-53 present preliminary figures which indicate that, during the period of this study, no consistent trend exists for any of the merit

variables which might indicate that production of meritorious works is increasing. The preliminary nature of this evidence must be stressed.

As a contribution to the background of research against which the second question might someday be examined, Tables 4-48 through 4-53 indicate that substantial disparity exists in the means across the years within categories. This may be only an effect of sample size, or it may point to a disequilibrium of unknown cause which warrants further examination.

Another issue which should produce fruitful future research centers on the influence of centralized (university) and decentralized (departmental) criteria for the award of tenure. The data used in this study were gathered from the centralized computer files of the Office of Academic Affairs. The purpose of such a large, meticulously maintained data base is unclear in view of the results of this study.

If central administrators take an active role in the tenure award process, the validity of these merit measures as evaluative criteria is questionable in light of the statistical disparities discussed here. If they do not actively participate in the process, then the question arises as to the cost effectiveness of this cataloguing function.

At the beginning of this chapter, the following statement was made:

> The newcomer to any social structure faces evaluation. In the best of circumstances, the evaluative criteria are acknowledged by all in advance.

Various measures frequently quoted in the literature review were examined here for their discriminatory power in differentiating successful tenure candidates from faculty in tenure-accruing status. No university document was available to this author which delineated particular criteria for achieving tenure. Byse and Joughin (1959) maintain that none should exist. The statistical analyses conducted herein have led to ambiguous results concerning the importance of the measures examined.

The shortcomings of the data have been discussed at length--such as group size disparity, lack of information concerning which faculty were considered for tenure but denied, and the very small representation of women and ethnic minorities within the faculty ranks--to name a few. Still, with one-third of the necessary comparisons performed, a nagging doubt remains concerning the consistency of evaluations for tenure. Further, if these are the elements of the criteria, why did so few of the tests result in significant findings?

Byse and Joughin consider faculty evaluation to be a delicate operation. In this era of collective bargaining, equality of opportunity, and affirmative action, the delicate operation will be subject to increased and perhaps indelicate scrutiny.

It is hoped that continued research will either verify the validity of the measures considered here, or provoke the foundation

of standards which can be used realistically by administrators at the various levels of academic affairs. Parsimony dictates that evidence not relevant to the decision at hand be discarded.

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Robert R. Sherman, Chairman
Professor
Foundations of Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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